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— 17 —

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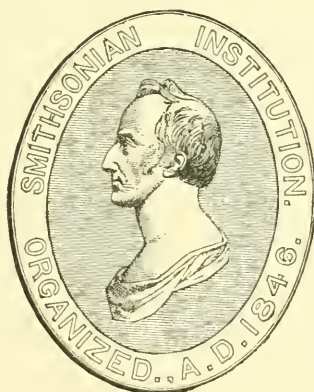
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VOL. XIX.



SMITHSONIAN
MISCELLANEOUS COLLECTIONS.

VOL. XIX.



"EVERY MAN IS A VALUABLE MEMBER OF SOCIETY WHO BY HIS OBSERVATIONS, RESEARCHES,
AND EXPERIMENTS PROCURES KNOWLEDGE FOR MEN."—SMITHSON.

E. C. SMITHSON
ata

WASHINGTON:
PUBLISHED BY THE SMITHSONIAN INSTITUTION.
1880.

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Advertisement.

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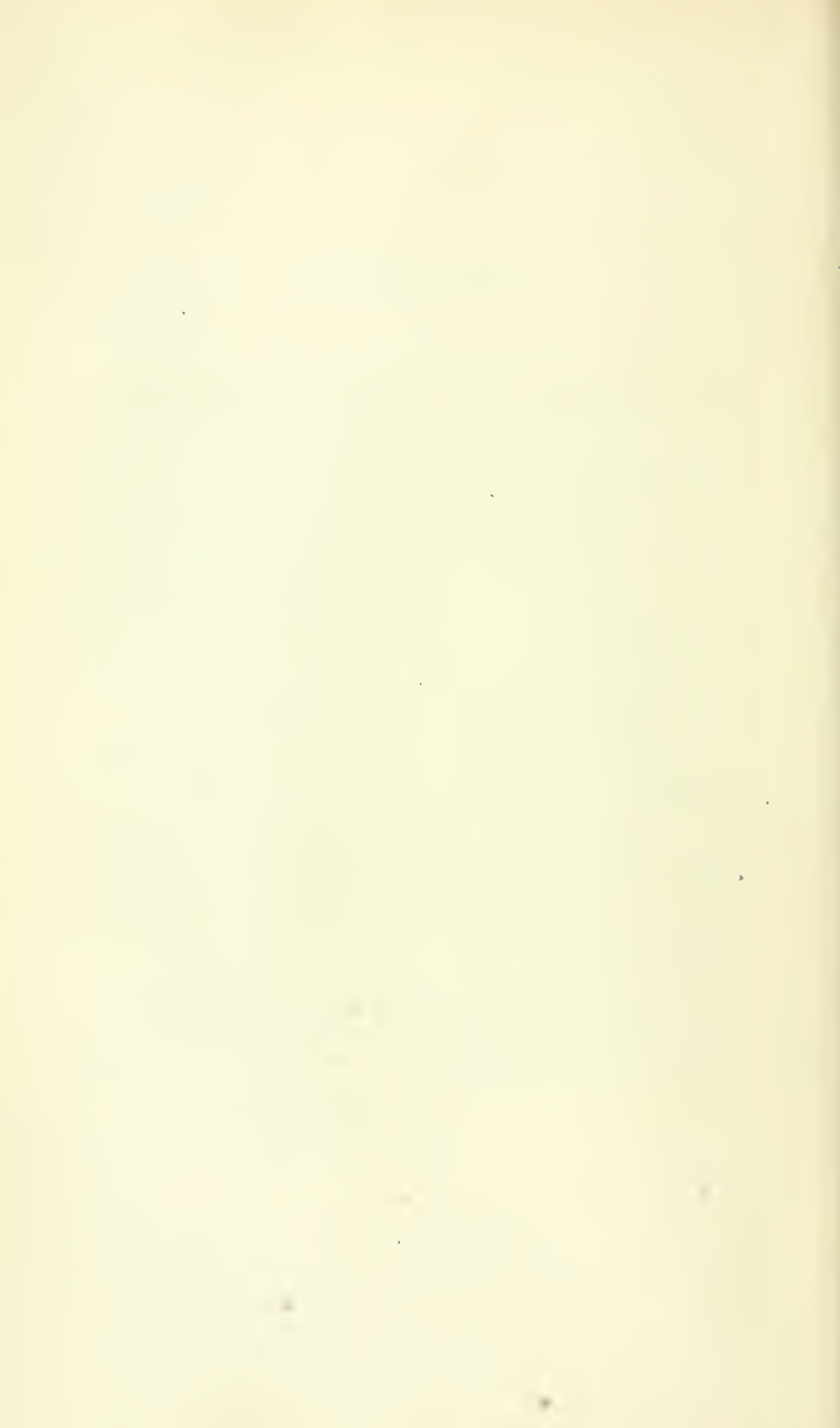
The present series, entitled "Smithsonian Miscellaneous Collections," is intended to embrace all the publications issued directly by the Smithsonian Institution in octavo form; those in quarto constituting the "Smithsonian Contributions to Knowledge." The quarto series includes memoirs embracing the records of extended original investigations and researches resulting in what are believed to be new truths, and constituting positive additions to the sum of human knowledge. The octavo series is designed to contain reports on the present state of our knowledge of particular branches of science; instructions for collecting and digesting facts and materials for research; lists and synopses of species of the organic and inorganic world; museum catalogues; reports of explorations; aids to bibliographical investigations,¹ etc., generally prepared at the express request of the Institution, and at its expense.

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SPENCER F. BAIRD,
Secretary Smithsonian Institution.



PROCEEDINGS
OF THE
UNITED STATES NATIONAL MUSEUM.
1878.

DESCRIPTIONS OF NEW FORMS OF MOLLUSKS FROM ALASKA
CONTAINED IN THE COLLECTIONS OF THE NATIONAL
MUSEUM,

By W. H. DALL.

CHITONIDÆ.

Genus AMICULA Gray.

Type *A. vestita* Sowerby.

Subgenus CHLAMYDOCHITON Dall.

Ch. t. '*Amiculæ*' similiter sed branchiæ ambientes.

Type *Chiton amiculatus* Pallas.

Amicula proper has the branchiæ median.

Genus LEPTOCHITON Gray.

Leptochiton Belknapi Dall, n. s.

L. t. elongatâ, valde elevatâ, dorsualiter angulatâ; albidâ plus minusve cinereo et nigro tinctâ; valvis elevatis, apicibus distinctis; mucrone centrali conspicuo; sculptura ut in *L. alveolo*, sed granulis in areis dorsualis sparsim et quincuncialiter dispositis; valva postica sub apice concava, posticè sinuatâ; zona minimâ spiculis tenuibus versus marginem munitâ. Lon. 10, lat. 3^{mm}. Div. 90°.

Hab.—North Pacific Ocean, in lat. 53° 08' N., and lon. 171° 19' W., at a depth of 1006 fathoms, black sand and shells. Brought up in the sounding-cup, on the sounding expedition of the United States ship *Tuscarora*, Capt. George E. Belknap, U. S. N., in 1874.

This specimen comes from a greater depth than any specimen of the order hitherto collected. It is nearest to *L. alveolus* Sars, from the coast of Norway.

Genus TRACHYDERMON Cpr.

Subgenus TRACHYRADSLA Cpr. (Ms.).

Trachydermon, valvis centralibus bi- seu pluri-fissatis.

Type *Chiton fulgetrum* Reeve.

Trachyradsia aleutica Dall, n. s.

T. t. parvâ, rufo-cinereâ, oblongâ, fornicatâ; jugo acutissimo; mucrone

submediano, apicibus prominentibus; arcis lateralis inconspicuis; totâ superficie quincuncialiter minute reticulatâ; *intus*, valv. aut. 16-, post. 11-, centr. 2-fissatis; dent. parvis, perspongiosis, late separatis; subgrundis spongiosis, curtis; sinu parvo; *zona* squamulis minutis obsitâ. Lon. 6, lat. 3^{mm}.

Hab.—Western Aleutians, near low-water mark; Dall.

This bears no marked resemblance to any of the other Alaskan species.

Genus TONICELLA Cpr.

Type *Chiton marmoreus* Fabr.

Tonicella saccharina Dall, n. s.

T. t. parvâ, oblongâ, totâ superficie saccharina, rufo et albescente pictâ; mucrone submediano, inconspicuo; arcis lateralis inconspicue elevatis, albescentis; arcis dorsualis sanguinosis, æque quincuncialiter lente reticulatis; v. ant. 10–11-, v. post. 8–10-, v. centr. 1 fissatis; dent. parvis spongiosis, sinu parvo; subgrundis spongiosis, mediocris; *zonâ* coriaceâ ut in *Tonicellæ* aliis: branchiæ mediæ. Lon. 6.5, lat. 4^{mm}.

Hab.—Aleutian Islands, three to thirteen fathoms; Dall.

This species has the lustre of rock-candy, and is well marked by the contrast of the white lateral with the red dorsal areas.

Genus SCHIZOPLAX Dall.

Testa et *zona Tonicellæ* simulans; valvæ centrales sulco jugali mediano, antico argute incisæ; branchiæ subambientes.

Type *Chiton Brandtii* Midd.

For this remarkable Alaskan form, distinguished from all other Chitons by its slit central valves, I propose to adopt a name suggested by Dr. Carpenter, who, on Middendorf's figures, had intended to propose it as a subgenus of *Tonicella*. The specimens obtained by my party seem to be the first found since the original ones were obtained. A careful examination of the soft parts shows that in dentition and some other details sufficient basis for generic separation is found, confirming the testimony of the valve characters. The sulcus is usually filled by a horny or cartilaginous deposit.

It may be added here that investigation of the characters of the radula in numerous species and genera of Chitons in the National Museum shows a very remarkable uniformity of dentition. No larger groups than genera are indicated in the whole order, which, it appears, can hardly comprise more than one family; and it is doubtful if this can be divided into subfamilies by any characters yet elucidated.

The dentition in all species examined has the formula $6 \cdot 2 \cdot 1 \cdot 2 \cdot 6$, or $\frac{1}{8 \times 8}$. Of the teeth, the rhachidian appears always simply cusped;

the two laterals present varied characters; the third uncinus, counting outward, is usually spatulate; while the remainder are mere bosses, or scales. The wide differences found in the few figures of the dentition of Chitons extant appear to be due to erroneous interpretation of the objects represented. The figures of Lovén are the most satisfactory.

POSTPLIOCENE FOSSILS IN THE COAST RANGE OF CALIFORNIA,

By W. H. DALL.

The National Museum has received from Mr. G. F. Merriam, of San Luis Rey, Cal., specimens of *Donax californicus*, *Chione succincta*, *Olivella biplicata*, and *Cerithidea sacrata*, in a semi-fossilized condition. The first mentioned retained a considerable part of its pinkish interior coloration. These fossils (probably with other species) are stated by Mr. Merriam to be found in great abundance at the head of a cañon in that vicinity, in the heart of the Coast Range, twelve miles from the sea in a direct line, and six hundred feet above tide-water. All the species are found living in abundance on the present sea-coast. This indicates a very recent elevation for this part of the coast, if the facts are correctly interpreted, and further specimens and details will be awaited with interest.

NOTES ON THE AMERICAN SPECIES OF THE GENUS CYBIUM.

By FELIPE POEY.

[Translated by G. BROWN GOODE, from MS. memorandum of Professor FELIPE POEY.]

Cybius caballa, Cuv. & Val.

Cybius caballa, CUVIER & VALENCIENNES, Histoire Naturelle des Poissons, viii, 1831, p. 187.—GÜNTHER, Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum, ii, 1860, p. 373.—POEY, Repertorio Físico-Natural de la Isla de Cuba, i, 1867, p. 322; ii, p. 13; and in Synopsis Piscium Cubensium, *op. cit.*, ii, p. 362.

Cybius acervum, CUVIER & VALENCIENNES, *loc. cit.*, p. 186 (*nec typus*).

Vulgo:—Sierra.

Differential Characters.—First dorsal with fourteen spines, without a black spot anteriorly. Body immaculate in the adult, spotted with yellowish in the young fish.

The number of teeth increases with the age; in large specimens, it is $\frac{30}{25}$. The larger teeth are placed upon the middle of the jaw, those in the lower jaw being a trifle the longer. The lateral line is very sinuous upon the posterior portion of the body. The eye is larger than in *Cybius regale*.

Bluish upon the back, whitish under the belly. First dorsal white; second dorsal and caudal dusky-bluish (*bleu noirâtre*); pectorals bluish, as is also the anal, which, however, becomes white at its extremity; ventrals whitish.

In the young fish, under the length of two or three feet, the sides are covered with round, irregular spots, of rather dirty yellow (*jaune un peu sale*).

Cuvier described a specimen which weighed twenty-two pounds; at that size, the fish is still young, and retains its yellow spots.

Those ordinarily taken range in weight from twelve to twenty-five pounds, though they reach the weight of one hundred pounds. I have seen one which measured 285^{mm}.

Cybiwm regale, (Bloch) Cuvier.

Scomber regalis, BLOCH, *Naturgeschichte der ausländischen Fische*, taf. 333.

Cybiwm regale, CUVIER & VALENCIENNES, *op. cit.*, p. 184.—GÜNTHER, *op. cit.*, p.

372.—POEY, *op. cit.*, i, p. 322; ii, p. 362.

Vulgo:—*Pintada*.

Differential Characters.—The first dorsal has seventeen spines and the spot upon its anterior portion. The lateral bands and spots are persistent through life.

The teeth are $\frac{20}{16}$ in a specimen of moderate size. In the upper jaw, the median teeth are the larger; in the lower, their size is more nearly equal.

The back is bluish, as are also the top of the head, the second dorsal and its finlets, the caudal, and the pectorals. The first dorsal is white, having in front a spot of deep-blue, which is prolonged far back upon the upper edge of the fin. The anal and the ventrals are white. The sides are sky-blue, with silvery lustre; the belly is white, with a bluish tinge. The sides are marked with broken longitudinal bands and round spots; these bands and spots are yellow, more or less golden, and with a reddish tint.

The ordinary size is about twelve pounds, though they sometimes reach the weight of twenty.

Cybiwm acervum, Cuv. & Val.

Cybiwm acervum, CUVIER & VALENCIENNES, *op. cit.*, p. 186.

The specimens described by Cuvier were of five pounds weight. He claims to have received specimens from Martinique, from Santo Domingo, and from Cuba, those from the latter place sent by me. I can only say that I have not been able to find this species, and that I have not included it in my manuscript "*Ichthyologie*".

According to Cuvier, it has seventeen spines in the first dorsal, and also the black spot. The body is immaculate, even in the specimens of five pounds weight.

Cybiwm maculatum, (Mitchill) Agassiz.

Scomber maculatus, MITCHILL, *Transactions of the Literary and Philosophical Society of New York*, i, 1815, p. 426, pl. vi, fig. 8.

Cybiwm maculatum, AGASSIZ, in SPINX, *Selecta Genera et Species Piscium*, 1829, p. 103, tab. lx.—CUVIER & VALENCIENNES, *op. cit.*, p. 181.—GÜNTHER, *op. cit.*, p. 372.

The *Cybiwm maculatum* of the United States has the teeth somewhat conical and very pointed. It has seventeen dorsal spines and a black spot upon the first dorsal.

Cybium immaculatum, Cuv. & Val.

Cybium immaculatum, CUVIER & VALENCIENNES, *op. cit.*, p. 191.—GÜNTHER, *op. cit.*, p. 370, note 5.

The *Cybium immaculatum* of Cuvier has the body immaculate in specimens only six or seven inches long.

Acanthocybium peto, Poey.

Acanthocybium Petus, POEY, *Memorias sobre la Historia Natural de la Isla de Cuba*, ii, 1860, p. 234, pl. xvi, fig. 1; *Repert.*, ii, p. 363.

Vulgo:—*Peto*.

This genus differs from *Cybium* by its numerous dorsal spines, twenty-five in number. The type taken by Professor Gill has the teeth compressed, triangular. The Cuban species has the points of the teeth rounded. The caudal is very small. The lower jaw has its sides deeply notched and its extremity lower than its lateral edges. In specimens of less than three feet, the body is covered with vertical bands of a vitreous lustre (*glacées*). It grows very large, sometimes attaining the weight of one hundred pounds.

THE CLUPEA TYRANNUS OF LATROBE.

By G. BROWN GOODE

Mr. Benjamin H. Latrobe, a surveyor of public lands, published, in 1802, a description of a clupeoid fish the affinities of which have never been satisfactorily determined.* Dr. DeKay, misled by the name "alewife", applied the specific name *tyrannus* to the northern species known to him by that popular name (*Pomolobus pseudo-harengus*), a usage which was concurred in by Dr. Storer and M. Valenciennes. In his earlier writings, Professor Gill referred the same name to the shad (*Alosa sapidissima*). Latrobe's paper, and the name therein proposed, have lately been lost sight of; but there is little doubt that they refer to the menhaden, or mossbunker (*Clupea menhaden*, Mitchell, and *Brevoortia menhaden*, Gill). The laws of priority demand that this species shall henceforth be designated *Brevoortia tyrannus*.

The fishes of the Chesapeake and its tributaries have been very little studied until within the past three years, and the habits of the menhaden are so different in these waters and in the north that it does not seem surprising for Northern ichthyologists to have made mistaken identification of Latrobe's specific name.

A few years ago the Capes of Delaware were thought to define the southern range of the menhaden, while its peculiar parasite and its habit of ascending southern rivers were unknown.

*A Drawing and Description of the *Clupea tyrannus* and *Oniscus prægustator*. By Benjamin H. Latrobe, F. A. P. S. < Transactions of the American Philosophical Society held at Philadelphia for promoting useful knowledge, vol. v, 1802, p. 77.

I shall soon publish a full discussion of this subject. At present, my conclusions may be stated as follows:—

(1) The figure, while undeniably bad, resembles the menhaden very closely, while it cannot be intended to represent any allied species. The contour, were the missing dorsal fin supplied, is similar to that of the menhaden. The black spot upon the scapular region is constant in the menhaden only, though a similar one is occasionally seen upon the shad and alewife.

(2) The name “bay alewife” is the same now given to the menhaden in the Chesapeake and its tributaries. This is a strong argument: for although seventy-five years have passed since Latrobe wrote, the persistence of popular names is very remarkable, as I have elsewhere pointed out.* Moreover, Latrobe was also acquainted with a “her-ring” and a “shad”. These being eliminated, there is no other fish than the menhaden to which the description in question can refer.

(3) The habits of the alewife, as described by Latrobe, are essentially the same as those of the menhaden at the present day. The alleged river-ascending habits of the “bay alewife” were thought to throw its identity with the menhaden out of the question. This is no longer an obstacle.

(4) The presence of the crustacean parasite is the strongest argument of all. While this is found in the mouths of a large percentage of the southern menhaden, suggesting the local name of “bug fish”, it has never once been found attached to any other species, although careful search has been made by several persons. The northern menhaden is free from this parasite. This is still another reason for the failure to identify on the part of northern writers.

Latrobe's name has the priority over Mitchell's by thirteen years. It is to be regretted that it is necessary to replace by another a name so, appropriate and of such long standing.

JANUARY 1, 1878.

**THE OCCURRENCE OF *BELONE LATIMANUS* IN BUZZARD'S BAY,
MASSACHUSETTS.**

By G. BROWN GOODE.

A peculiar species of *Belone* was obtained at Wood's Holl, in 1875, by Professor Baird. It was caught in the weir on Great Neck, owned by the Wood's Holl Weir Company. On study, it proved to be the form described by Professor Poey under the name *Belone latimanus*, and hitherto known only from Cuba. A good water-color sketch (Cat. No. 795) was made by Mr. Richard, a photograph (Cat. No. 218) taken, and the specimen and a finely colored cast (Cat. No. 16121) are preserved in the National Museum.

*Catalogue of the Fishes of the Bermudas, 1876, p. 15.

It may be distinguished from the common species of our coast, *Belone longirostris*, (Mitchill) Gill, by many characters, the most salient of which are the more elongate form, the lesser proportionate length of the head, the much greater number of rays in the vertical fins (*B. latimanus* has D. 25: A. 23. *B. longirostris* has D. 13-16: A. 16-19), the broader and proportionately shorter pectorals, and the forked caudal.

The length of the specimen was 49 inches (1244.6 millimetres), its weight $5\frac{1}{4}$ pounds (2381 grams).

COLOR:—Back, top of head, and snout dark green in dead specimen, probably beryl-green in life. Fin-rays greenish-brown. Fin membranes and protected parts, such as axils of pectoral fins, colorless. Sides light brownish, with silvery overwash. Belly, cheeks, throat, and lower part of lower jaw silvery-white. Eye greenish-yellow.

Radial formula.—Branchiostegals XIV. D. 24: A. 25: C. 7-6 + 7-5: P. 12: V. 6.

JANUARY 15, 1878.

THE VOICES OF CRUSTACEANS.

By G. BROWN GOODE.

The observations of Mr. Saville Kent and Mr. J. Wood Mason (NATURE, vols. xvi, p. 565, and xvii, p. 11) recall to mind some similar facts recently noted by me in the Bermudas.

Several species of *Alpheus* were observed to have the power of producing loud clicking sounds. Two or three of the larger species are accustomed to lurk under flat stones near low-water mark. Some of these are two inches long. When one of them is taken between the fingers by an inexperienced collector, the sudden, convulsive snap almost invariably causes him to drop it. The effect is like that of a sharp blow across the knuckles. Some smaller species of the genus are found only in the cavities of a large aplysine sponge, abundant on the reefs. I have picked out seventy or eighty from a fragment of sponge not more than three inches in diameter. When the sponge is taken in the hand, the quick succession of clickings reminds one of the sound of instruments in a large telegraph office. When one of these animals is put in an earthen or glass vessel, it makes a much louder noise, resembling a quick tap with the finger-nail or the back of a knife upon the edge of the same vessel. This noise is produced by a convulsive snapping of the last joint of the large claw, by a movement resembling that of the spring beetles (*Elateridae*), and the sounds are quite similar. Possibly these movements may have a protective object, enabling the little decapods to escape from the grasp of enemies, or to work out from under the stones and loose sand in which they must often become buried.

Another macrurous crustacean, *Gonodactylus chiragra*, known to the

Bermudians as the "split-thumb", from its power of wounding by a sharp appendage of the larger claws, produces a viciously sharp, snapping noise, apparently in the same manner with *Alpheus*.

The "Bermuda lobster" (*Panulirus americanus* M. Edw.) makes a loud grating noise. Mr. Kent describes the voice of the allied species (*Panulirus quadricornis*) as being produced by the rubbing together of the spinous abdominal segments. In the species observed by me, the sound was produced by means of certain modifications of the lower joints of the antennæ. There is at the base of each antenna, upon the anterior part of the cephalo-thorax, a broad elevated ridge, parallel with the axis of the body, which in an adult of eighteen inches would be about two inches long. The rounded crests of these ridges are closely embraced by processes from the sides of the basal antennal segments. The profile of each ridge describes the segment of a circle, the centre of which is the centre of articulation of its accompanying antenna. When the antennæ are moved forward and backward, their tips waving over the back of the animal, the close contact of the hard, smooth, chitinous surfaces produces a shrill, harsh stridulation, like the sound of filing a saw. I have never heard the noise when the animals were under water, though I have seen them waving their antennæ. I have no doubt that they can thus produce vibrations perceptible to their mates at great distances, especially if their other senses are as acute as that of smell, which I have tested in a very curious manner. Both sexes are provided with the vocal organs.

DECEMBER 25, 1877.

ON A NEW HUMMING BIRD (ATTHIS ELLIOTI FROM GUATEMALA.

By ROBERT RIDGWAY.

Having had occasion, recently, to examine some specimens of Humming Birds, I happened to notice certain striking differences between two examples labelled "*Atthis heloisæ*"—one from Guatemala, belonging to Mr. D. G. Elliot, the other a Mexican specimen, in my own collection, obtained from M. Boucard. The differences observed between these were so obvious that I immediately inspected the series contained in the collection of the National Museum, and on comparison found them repeated in the specimens contained therein, including two males from Jalapa and one from the Volcan de Fuego, Guatemala. The former of course represent the true *A. heloisæ*, being from the locality whence the types of that species were procured, and with them my Mexican example agrees in all essential particulars. Both the Guatemalan specimens, however, are very different from any of these, and undoubtedly represent a distinct species, which being, so far as I have been able to ascertain, hitherto unnamed, I propose to characterize as follows:—

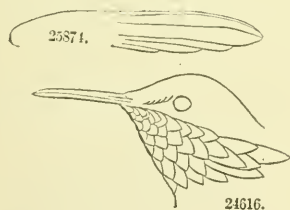
ATTHIS ELLIOTI.

"*Selasphorus heloisæ*", SCL. & SALV., Ibis, i, 1859, 129 (Guatemala); *ib.* 1860, 195 (Duenas, Guatemala).—SALVIN, *ib.* 266 (Guatemala; Tierra Caliente, and slopes of Volcan de Fuego).

"*Atthis heloisæ*", B. B. & R., Hist. N. Am. B. ii, 1874, 465 (part: Guatemala references).

Specific Characters.—*Adult male*.—Outer primary broad, the end not attenuated. Gorget uniform reddish-purple (much as in *Calypte annæ*), without varying tints of violet, as in *A. heloisæ*. Jugulum wholly white; middle of the abdomen white; sides light rufous, slightly glossed with golden-green; crissum white, tinged with light rufous. Upper parts metallic-green, decidedly less golden than in *A. heloisæ*. Tail with the basal half (approximately) bright cinnamon-rufous, the subterminal portion black; three outer feathers (on each side) tipped with rusty-white; the middle pair with the black portion above glossed with metallic-green anteriorly. Wings uniform dusky, the smaller coverts metallic-green. Wing, 1.35; tail, 1.00–1.05; culmen, 0.38–0.40. [Type, No. 20494, ♂ ad., Coll. U. S. Nat. Mus., Volcan de Fuego, Guatemala.]

With a very close general resemblance to *A. heloisæ*, this species may be immediately distinguished by the very different form of the outer primary, the redder and more uniform color of the throat-gorget, and the shorter bill. The peculiar characters of the two may be contrasted as follows:—



Atthis heloisæ, ♂. Jalapa. Dr. Heermann.



Atthis ellioti, ♂. Guatemala. Bourcier.

***A. ellioti*.**

Outer primary broad, the end not attenuated. Gorget uniform purplish-red, without varying violaceous tints. Wing, 1.35; tail, 1.00–1.05; culmen, 0.38–0.40.

Hab.—Guatemala.

***A. heloisæ*.**

Outer primary very narrow, the end abruptly attenuated. Gorget reddish-violet, showing decided violet tints in certain lights. Wing, 1.30–1.50; tail, 0.95–1.10; culmen, 0.48–0.50.

Hab.—Eastern Mexico.

The principal synonymy and characters of *A. heloisæ* are as follows:—

ATTHIS HELOISÆ.

Ornismya heloisæ, LESS. & DELATTE., Rev. Zool. 1839, 15 (Jalapa and Quatepu, S. E. Mexico).

Mellisuga heloisæ, GRAY, Gen. B. i, 1849, 113, sp. 62.

Tryphæna heloisæ, BONAP., Rev. et Mag. Zool. 1854, 257.

Selasphorus heloisæ, GOULD, Monog. Trochilid. iii, 1852, pl. 141.

Atthis heloisæ, REICHENB., J. f. O. 1853, App., 12.—GOULD, Introd. Trochilid. 8vo ed. 1861, 89.—ELLIOT, Illustr. Am. B. i, 1869, pl. —.—COOPER, Orn. Cal. i, 1870, 361 (El Paso, Texas; Mexico).—B. B. & R., Hist. N. Am. B. ii, 1874, 465, pl. 47, fig. 6 (El Paso, Texas; Mexico).

Specific Characters.—*Adult male*:—Outer primary very narrow, the end abruptly attenuated. Gorget violet-purple, with changeable tints in varying lights. Jugulum wholly white; middle of the abdomen white; sides light rufous, slightly glossed with golden-green; crissum white, tinged with light rufous. Upper parts metallic golden-green, more bronzy than in *A. ellioti*. Tail with the basal half (approximately) clear cinnamon-rufous, the subterminal portion black, with the three outer feathers (on each side) tipped with rusty-white; middle pair of feathers glossed with golden-green on the upper surface to the extreme tip. Wings uniform dusky, the smaller coverts golden-green. Wing, 1.30–1.50; tail, 0.95–0.10; culmen, 0.48–0.50.

Of the three adult males of *A. heloisæ* now before me, the two from Jalapa are much alike; but that in my own collection, which is evidently from another part of Mexico, although, unfortunately, the precise locality is not stated on the label, differs in several very noticeable particulars. The bill is very much more slender, the wing shorter (about 1.30, instead of 1.50), and the general size decidedly less. What is most conspicuous, however, is the fact that the lateral feathers of the gorget are not elongated as in the Jalapa specimens, in which they are 0.25 to 0.30 of an inch longer than the longest feathers of the middle portion, while there is a mixture of bluish-violet in the gorget not observable in the other specimens. It is barely possible that the longer lateral plumes of the gorget have been lost from this specimen; but in any event, the differences are quite sufficient to characterize a well-marked local race.

JANUARY 29, 1878.

FOSSIL MOLLUSKS FROM LATER TERTIARIES OF CALIFORNIA.

By W. H. DALL.

The National Museum has recently received from Mr. Henry Hembill a series of fossil shells collected by him from the later Tertiary deposits of the Californian coast. Some of them are from the vicinity of Santa Barbara, but the majority are from San Diego, part of them

(marked *w* in the list) from the material obtained in sinking a well* at a distance of from ninety to one hundred and sixty feet below the surface of the earth, and not far from the present sea-level. The matrix is usually rather soft, composed of loosely aggregated grains of sand or fine sandy mud, occasionally hardened by infiltration of lime-bearing water.

In the accompanying list, those species found living (R) at the present day in the fauna of the Californian coast, between San Francisco and San Diego, are marked L, those at present making part of the northern or Oregonian fauna N, and those belonging to the fauna of Lower California, the Gulf of California, Mexico, and Central America are marked S. The extinct species (F) form a very small proportion of the whole, as will be readily seen.

7907	<i>Laqueus californicus</i> (Koch) Dall	San Diego.	R	N, L
8	<i>Pholadidea ovoides</i> Gld.	"	R	N, L
9	<i>Corbula luteola</i> Cpr.	"	R	L
7910	<i>Periploma argentaria</i> Conr	"	R	L, S
1	<i>Solecurtus californianus</i> Conr	"	R	L, S
2	<i>Macoma secta</i> Conr	"	R	L
3	<i>Macoma indentata</i> Cpr	"	R	L
4	<i>Macoma nasuta</i> Conr	"	R	N, L
5	<i>Macoma</i> (like) <i>sabulosa</i> Spengler	"	R	N
6	<i>Tellina modesta</i> Cpr.	"	R	I
7	<i>Tellina Bodegensis</i> Hds.	"	R	L
8	<i>Cumingia californica</i> Conr.	"	R	L
9	<i>Donax flexuosus</i> Gld.	"	R	L, S
7920	<i>Maetra californica</i> Conr	"	R	L
1	<i>Maetra falcata</i> Gld	"	R	N, L?
2	<i>Clementia subdiaphana</i> Cpr	"	R	N, L
3	<i>Chione simillima</i> Sby.	"	R	L, S
4	<i>Chione succincta</i> Val	"	R	L, S
5	<i>Dosinia ponderosa</i> Gray.	"	R	S
6	<i>Tapes staminea</i> Conr.	"	R	N, L
7	<i>Saxidomus aratus</i> (jun.) Gld.	"	R	L
8	<i>Petricola pholadiformis</i> ? Lam.	"	R	.
9	<i>Cardium procerum</i> Sby.	"	R	S
7930	<i>Venericardia monilicosta</i> Gabb	" <i>w.</i>	R	L
1	<i>Venericardia monilicosta</i> Gabb	Santa Barbara.	R	L
2	<i>Lucina Nuttallii</i> Conr	San Diego.	R	L
3	<i>Lucina acutilineata</i> Conr	"	R	N, L
4	<i>Arca microdonta</i> Conr	" <i>w.</i>	F	.
5	<i>Arca profunda</i> Dall, n. s.	"	F	.
6	<i>Nucula exigua</i> Sby	"	R	S
7	<i>Leda celata</i> Hds.	" <i>w.</i>	R	L, S
8	<i>Pecten islandicus</i> Mull	"	R	N
9	<i>Pecten hericeus</i> Gld	"	R	N
7940	<i>Pecten ventricosus</i> Sby. (var. ?)	"	R	S
1	<i>Pecten expansus</i> Dall, n. s.	"	F	.
2	<i>Pecten Stearnsii</i> Dall, n. s.	"	F	.
3	<i>Pecten Hemphillii</i> Dall, n. s.	"	F	.
4	<i>Pecten</i> ? <i>æquisulcatus</i> Cpr. var	"	R	L, S
5	<i>Pecten</i> ? <i>panicostatus</i> Cpr. jun.	"	R	L, S
6	<i>Janira dentata</i> Sby	" <i>w.</i>	R	L, S
7	<i>Ostrea lurida</i> Cpr	"	R	N, L
8	<i>Ostrea Veatchii</i> Gabb	"	F	.
9	<i>Anomia limatula</i> Dall, n. s.	"	R	.
7950	<i>Rhectaxis punctoculata</i> (Cpr.) Dall.	"	F	L
1	<i>Tornatina cerealis</i> Gld.	"	R	N, L
2	<i>Tornatina eximia</i> ? Baird	"	R	N

* A list of species obtained from this well, with descriptions of new species, was published by me in the Proc. Cal. Acad. Sci., v, pp. 296-299, 1874.

7953	<i>Cylichna alba</i> Brown	San Diego. w.	R	N, L?
4	<i>Folcula cylindrica</i> Cpr	"	R	L
5	<i>Melampus olivaceus</i> Cpr	"	R	L
6	<i>Dentalium hexagonum</i> Sby	"	R	S, L?
7	<i>Cadulus fusiformis</i> ? Phil.	"	?	
8	<i>Aemæa mitra</i> Esch	"	R	N, L
9	<i>Aemæa insessa</i> Hds	"	R	N, L
7960	<i>Fissurella volcano</i> ? Reeve	"	R	L
1	<i>Fissurellidea callomarginata</i> Cpr	"	R	L
2	<i>Chlorostoma Pfeifferi</i> Phil	"	R	L
3	? <i>Vitrinella</i> sp. ind.	"	?	S
4	<i>Crucibulum spinosum</i> Sby	"	R	L, S
5	<i>Crepidula princeps</i> Cour	" w.	R?	N
6	<i>Crepidula adunca</i> Sby	"	R	L
7	<i>Serpulorbis squamigerus</i> Cpr	"	R	L, S
8	<i>Turritella Cooperi</i> Cpr. var	" w.	R	L
9	<i>Ceritheda sacra</i> Gld	"	R	L
7970	<i>Bitium quadrifidum</i> Cpr	Santa Barbara.	R	L
1	<i>Bitium asperum</i> Cpr	"	R	L
2	<i>Litorina scutulata</i> Gld.	San Diego.	R	N, L
3	<i>Lacuna vineta</i> Mont.	Santa Barbara.	R	N
4	<i>Lacuna solidula</i> Lovén	San Diego.	R	N
5	<i>Rissoina</i> (like) Woodwardi Cpr	"	R	S
6	<i>Murella simplex</i> Cpr	"	R	L, S
7	<i>Drillia pectiolata</i> Cpr	"	R	L, S
8	<i>Drillia Hemphilli</i> Stearns	"	R	S
9	<i>Sureula Carpenteriana</i> Gabb	"	R	L
7980	<i>Mangelia angulata</i> Cpr	"	R	L
1	<i>Comus californicus</i> Hds	"	R	L
2	<i>Odostomia gravida</i> Cpr	"	R	L
3	<i>Turbonilla stylina</i> ? Cpr	" w.	R	L
4	<i>Turbonilla chocoata</i> Cpr	"	R	L, N?
5	<i>Turbonilla virgo</i> ? Cpr	"	R	L
6	<i>Turbonilla torquata</i> ? Cpr	"	R	L
7	<i>Eulima micans</i> Cpr	"	R	L
8	<i>Scalaria indianorum</i> Cpr	"	R	L
9	<i>Scalaria indianorum</i> var	"	R	L
7990	<i>Scalaria tineta</i> Cpr	"	R	L
1	<i>Scalaria Hemphilli</i> Dall, n. s.	"	F	.
2	<i>Opalia anomala</i> Stearns	"	F	.
3	<i>Opalia varicostata</i> Stearns	"	F	.
4	<i>Cerithopsis assimolata</i> Cpr	"	R	L
5	<i>Cancellaria</i>	" w.	.	.
6	<i>Cancellaria</i>	" w.	.	.
7	<i>Neverita Recluziana</i> Petit	"	R	L, S
8	<i>Neverita Recluziana</i> var. <i>alta</i> Dall	"	R	L
9	<i>Mamma nana</i> Möller (Fos. Japan Tert.)	"	R	N
8000	<i>Ranella muriciformis</i> Brod. var.	"	R	S
1	<i>Mitra maura</i> Swains	"	R	L, S
2	<i>Olivella biplicata</i> Soy	"	R	L
3	<i>Olivella boetica</i> Cpr	"	R	N, L
4	<i>Nassa fossata</i> Gld	"	R	L
5	<i>Nassa fossata</i> var	"	R	L
6	<i>Nassa perpinguis</i> Hds	"	R	L, S
7	<i>Nassa tegula</i> Rvo	"	R	L, S
8	<i>Nassa mendica</i> Gld	" w.	R	N, L
9	<i>Astyris gausapata</i> Gld. vars	Santa Barbara.	R	L
8010	<i>Nitidella Gouldii</i> Cpr	San Diego.	R	N, L
1	<i>Amphissa versicolor</i> Dall	"	R	L
2	<i>Amphissa versicolor</i> Dall	Santa Barbara.	R	L
3	<i>Monoceros engonatum</i> Cour	San Diego.	R	L
4	<i>Cerostoma Nuttalli</i> Cour	"	R	L
5	<i>Pteronotus festinus</i> Hinds	"	R	L
6	<i>Trophon</i> (orpheus jun.?)	Santa Barbara.	R	N, L
7	<i>Purpura crispata</i> Chemn	San Diego.	R	N, L
8	<i>Fusus Harfordi</i> Stearns	"	R	N, L?
9	<i>Serpula</i> sp. indet	"	?	.
8020	Fish-teeth, one species, indet	"	?	.

This, it will be observed contains one hundred and seven well determined species, omitting several doubtful ones, of which ten are extinct and ninety-seven still found recent. Of these recent or still existing forms, twenty are found in the Californian fauna and northward at the present time. Eighteen more are found in the Californian fauna and southward, while forty-four are strictly Californian. Besides these, there are eight species belonging to the Oregonian or Arctic fauna, and no longer found living in the Californian region. Seven more are found on the west coast of Mexico, the Gulf of California, or Western Middle America, and, so far as known, no longer in the Californian region. One or two species are still found living in Atlantic seas, but not on the western shores of America. How far these peculiarities of distribution may be explained by a restriction of their geographical range in modern times by some species, or by the association of fossils in one collection from beds of differing age, and consequently exhibiting the fluctuation of the northern and southern faunæ based on varying temperatures of the sea, will be determined only by a most critical stratigraphical study of the localities.

But in either case the problem is well worthy of solution. The very modern character of the beds is determined by the great majority of the species being still found living, and by the fact that some of them retain very evident traces of their original coloration. They are mostly in excellent preservation. The well fossils taken with those mentioned on p. 3 would give a vertical range of some six hundred feet for the Pliocene Tertiary beds of California.

The species which appear to be new are as follows:—

Axinea profunda, n. s. (7935).

Shell subtriangular, ventral margin rounded, umbos erect, rather small. Area narrow, deep; marked by five or six lines meeting at an angle in the vertical of the umbo, one above another; anterior lines somewhat the shortest; exterior marked by twenty-five or thirty flattened ribs, separated by deep channels one-fourth as wide as the ribs, and by which the interior margin is crenulated. The ribs are crossed by thread-like close lines of growth, which may be elevated or obsolete on the ribs, but are sharply defined in the channels, which they partially fill up in some specimens. Toward the anterior and posterior margins, the sculpture is nearly obsolete. In eroded examples, this sculpture may be entirely altered, and such are hardly recognizable as the same thing. Interior smooth or lightly radiately striate, with a tendency to an elevated narrow ridge behind the anterior scar; hinge with teeth placed as if radiating from the centre of the valve, six to nine anteriorly, and ten to fourteen posteriorly, with some ten or twelve small, crowded teeth between the two radiating sets, and placed perpendicularly and parallel with one another. Height, 32^{mm}; length, 30^{mm}; thickness, 20^{mm}; the last proportionally greater in the young.

This species differs in its sculpture from any of the recent species ascribed to the coast, and from *A. barbarensis* Conr. (Pliocene foss.) by its shorter, more elevated, and deeper form, as well as by details of sculpture.

Pecten expansus, n. s. (7941).

Shell large, thin, with the upper valve flatter than the lower one, both with very slight convexity; outer surface of upper valves marked by sixteen to twenty sharp, radiating ridges, but slightly elevated, and whose sides shade off insensibly into the broad interspaces, which are but slightly depressed; faint indications of ridges appear between the principal ones. The entire surface is covered with fine, slightly raised, sharp lamellæ, which are waved in some places so regularly as to produce the appearance of a delicate reticulation, which, however, does not really exist; angle of the umbo about 120°; ears finely sculptured, like the rest of the surface, but with only faint indications of ridges, sharply differentiated from the rest of the shell, very short, broad; supra-foraminal ear with a sigmoid curve to the lateral margin; margin of the other ear nearly straight; hinge-line straight; interior of the valve smooth, except for faint depressions corresponding to the ridges; peripheral margins not crenulated, even or nearly smooth.

Lower valve with twenty-five or thirty dichotomous ribs, flattened above, but not sharply differentiated from the interspaces, sculptured with fine lines of growth or nearly smooth, with faint appearances of radiating striæ. Peripheral margin somewhat crenulated by the ends of the ribs; interior marked by shallow channels corresponding to the ribs; ears rather small and distinctly but not strongly marked off from the rest of the valve; byssal notch rounded, moderately deep. Height of shell, 135^{mm}; breadth of shell, 140^{mm}; breadth of hinge-line, 65^{mm}; thickness, 32^{mm}; some specimens one-half larger.

This shell is nearest *P. propatulus* Conr. (*caurinus*? of Gould) from the Miocene of Oregon, but differs in all its details when compared. The Miocene shell has a sharper umbonal angle, larger ears with straight lateral margins, and strong and different sculpture; the ribs are not dichotomous, and are much more sharply defined, while the margins are strongly crenulated. It is possible that some of the indeterminate nominal species of Conrad may have been based on this species, but the wretched figures given by him seem to differ strongly so far as they show any characters, while his descriptions are quite worthless, as usual.

Pecten Stearnsii, n. s. (7942).

Shell moderately large, thin, regular; elegantly radiately ribbed. Upper valve flattened or even a little concave, with about twenty four regularly rounded, vaulted, even ribs, separated by slightly wider channelled interspaces; the whole surface covered with fine, sharp, concentric, regular lamellæ, a little looped backward over the top of the ribs, but showing no appearance of reticulation anywhere; ears small, nearly

symmetrical, covered with more elevated, crowded, concentric lamellæ, especially near the margins; hinge-margin straight, or even a little concave toward the umbo; peripheral margins of the valves strongly and regularly crenulated and interlocking; interior regularly deeply grooved, to correspond with the external ribs; lower valve slightly convex, with about twenty-six regular even ribs, separated by channelled interspaces somewhat narrower than the ribs; the top surface of each rib is flattened with a broad, shallow groove in the middle, with one or two faint riblets on each side of the groove; the whole surface is covered with concentric lamellæ, like those of the upper valve, but less sharp, and about twice as crowded. Ears subequal, arched, covered with crowded, elevated lamellæ; byssal notch very small. Height of shell, 90^{mm}; breadth, 100^{mm}; breadth of hinge-line, 34^{mm}; thickness, 15^{mm}.

This very elegant species, while also showing some general resemblance to *P. caurinus* Gld., forms a passage toward the section *Janira*, and differs in many details from any described west-coast species, recent or fossil, so far as figures and descriptions serve to indicate.

Pecten Hemphillii, n. s. (7943).

This species has a strong general resemblance to the last, and is best described by comparison with it. *P. Hemphillii* is smaller, with sixteen ribs, as against twenty-six in a *P. Stearnsii* of the same size, with which throughout it will be compared; the lateral margins of the ears are perpendicular and straight, instead of outwardly rounded; the hinge-line is perfectly straight, not slightly concave; the ribs on the lower valve are flattened above, with symptoms of a groove on the top surface, instead of beautifully roundly vaulted; the interspaces are of course wider; the raised concentric lamellæ toward the periphery become long, coarse, and very crowded; on the lower valve, the shell is more vaulted, with hardly any traces of the raised lamellæ, and with larger, rude, hardly flattened, radiating ribs, which show no trace of grooving or riblets; the ears and byssal notch are smaller and more coarsely sculptured. Height, 56^{mm}; breadth, 63^{mm}; breadth of hinge-line, 28^{mm}; thickness, 15^{mm}.

This species seems to approach *Janira* even more closely than the last, but the value of these sections of *Pectinidae* is very questionable.

Anomia limatula, n. s. (7949).

Shell large, thin, irregular, with a rather thickened hinge-line; external surface rough (when not worn), like the fresh fractured surface of a piece of china-ware; a few faint radiating lines with the lines of growth comprise the sculpture; shell originally yellowish, and still retaining some of its color and lustre. Normal form apparently that of a *Pecten* without ears. Breadth, 75^{mm}; height, 70^{mm}; arch of valve, 10-15^{mm}.

No lower valves were obtained. This large species is neither *A. lampe* Gray nor *A. (Plac.) macroschisma* Desh., which are the only recent spe-

cies known to inhabit these coasts, while the only fossil one, *A. subcostata* Conrad, a species from the Colorado Desert, appears to be different, as the name would imply. For this reason, I have attached a name to the rather imperfect material received from Mr. Hemphill.

Scalaria Hemphillii, n. s. (7991).

Shell in general resembling a robust specimen of *S. indianorum*, having from nine to twelve varices on the last whorl, coronated behind near the suture, wholly pure white; surface of the whorls beneath the varices longitudinally delicately sculptured, with alternate riblets and grooves. Length about an inch; apical angle about 30°.

This species has the sculpture of *S. bellastrata*, but the shape of *S. indianorum*, and is the only grooved species, except the former, which has yet been reported from this region. All the specimens are decolate. The specimens were sent by Mr. Hemphill with the suggestion that they might prove to be new, and an examination has confirmed the suggestion. I take much pleasure in dedicating it to its discoverer.

The two species of *Cancellaria* mentioned were obtained from the San Diego well some years since, but having been mislaid cannot at this moment be identified. *Mamma nana* Möller is now found living in Arctic seas and fossil in the Tertiary of Japan.

WASHINGTON, February 3, 1878.

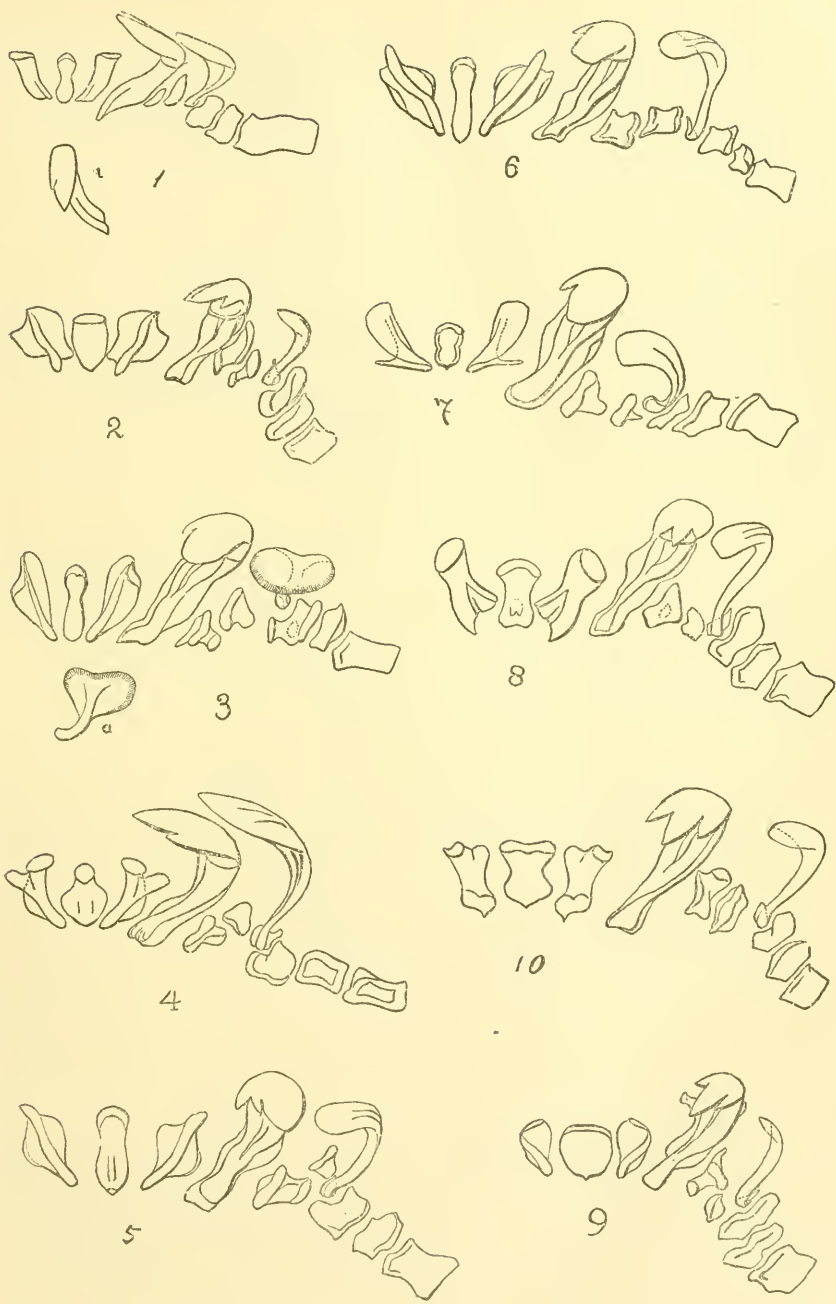
THE MANUFACTURE OF PORPOISE-OIL.

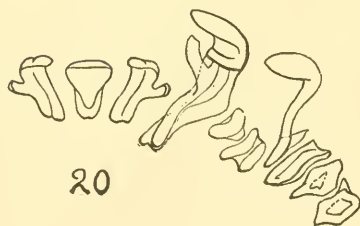
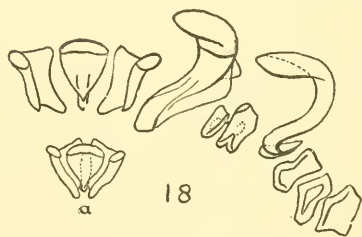
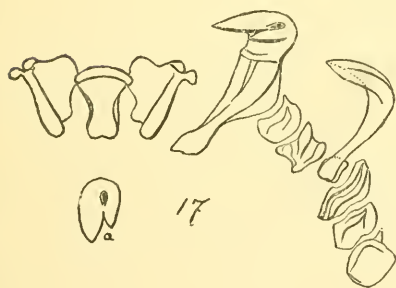
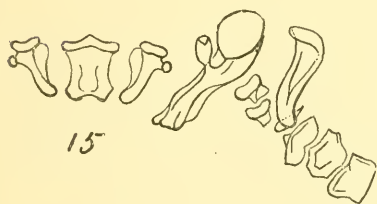
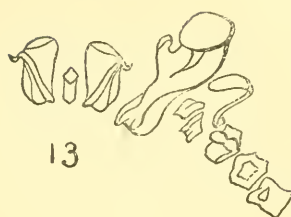
By Capt. CALEB COOK, of Provincetown, Mass.

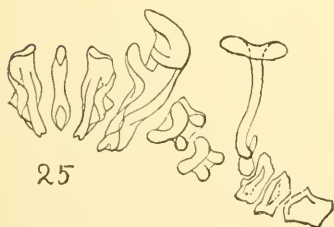
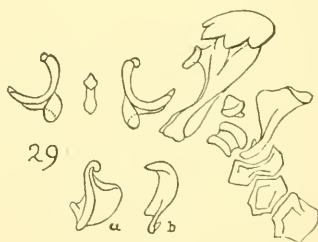
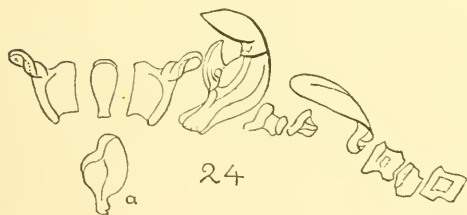
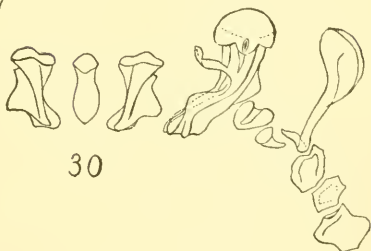
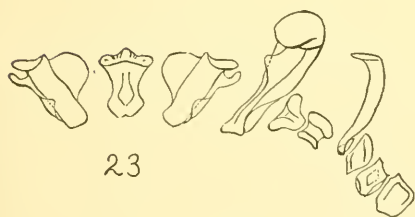
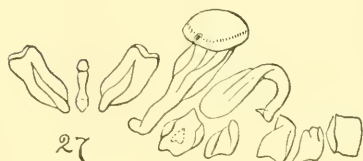
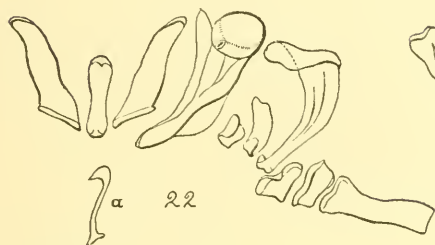
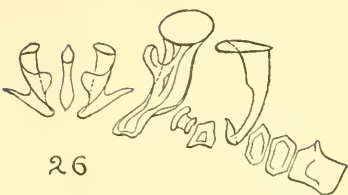
About the year 1816, sailors and fishermen having caught a porpoise on their voyage, would sometimes extract the oil from the jaw-bone and give it to carpenters and those who used oil stones for sharpening their tools. Finding in this way that it did not gum nor glue, suggested the idea that it was just what was wanted for a nice lubricator. It was noticed that the weather at zero would not congeal it, neither would it corrode on brass.

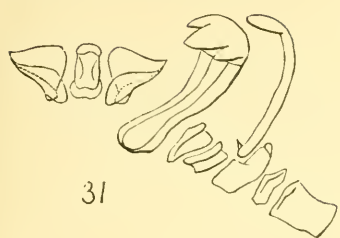
Watchmakers were then using olive-oil as the only fitting oil for watches; but by experimenting with the porpoise-jaw oil they found it superior to the olive or any other oil, consequently the sailors and fishermen found a ready market for all they were able to obtain.

This state of things continued until the year 1829, when a shoal of blackfish, about forty in number, was taken at Provincetown, Mass., being the first for many years. Solomon Cook, of that town, took from the jaws of those blackfish a few gallons of oil, and sent it to Ezra Kelley, of New Bedford, Mass., a skillful watchmaker, to be tested for watch-oil. Mr. Kelley soon found that this oil was superior to the porpoise-oil, as it had more substance and less chill. He contracted with Solomon Cook to supply him from year to year until 1840, when Solomon Cook died, and his oldest son supplied Mr. Kelley until the









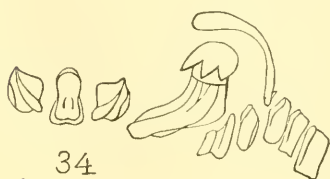
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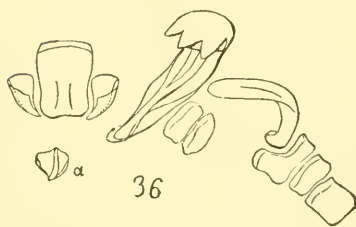


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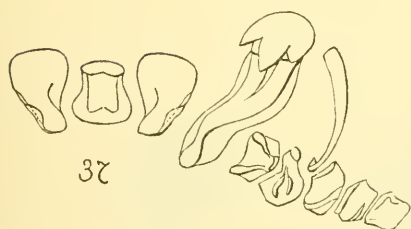
α

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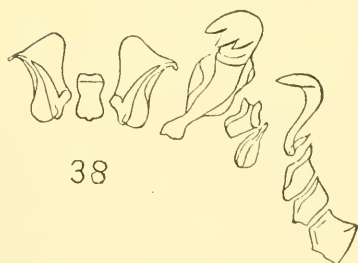


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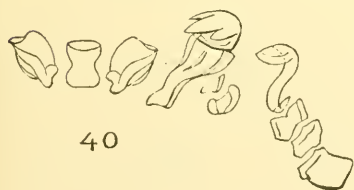
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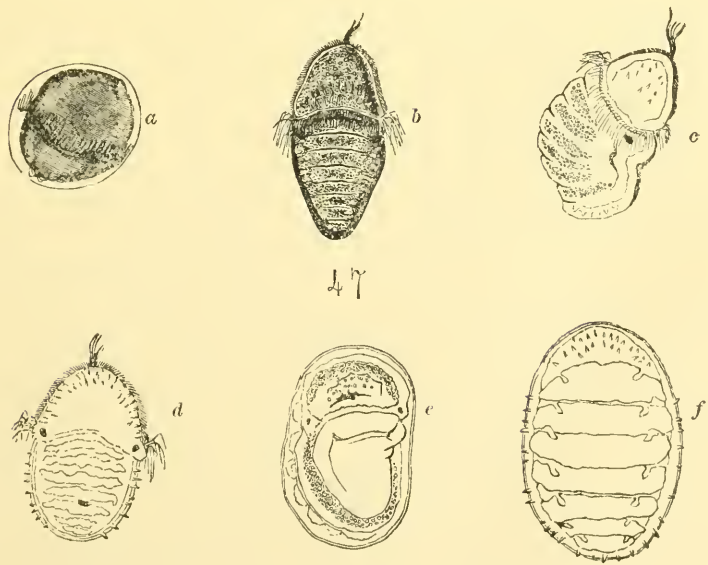
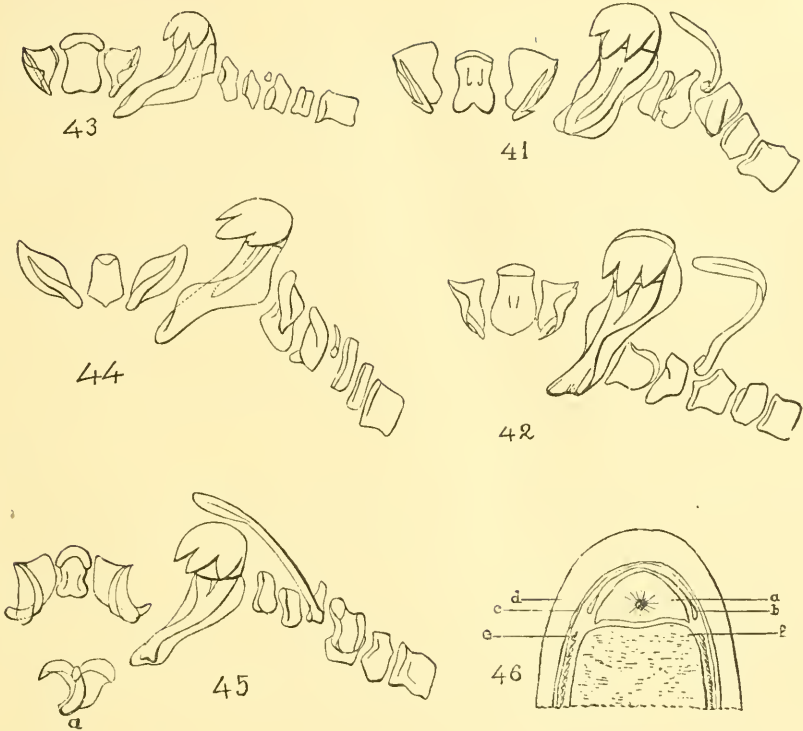
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demand was so great that the jaws of the blackfish were not sufficient to supply the market.

Porpoise-jaw oil can be refined a little by exposure to the cold at zero, and in that state, with the atmosphere at zero, it is strained through a cotton flannel strainer made in the shape of a cone, but when filtered through paper it is so limpid that it has no lubricating properties whatever, and becomes useless. This oil is called porpoise-jaw oil, but is taken from the blackfish, belonging in the family of whales, by a method known only by myself. It is warranted not to congeal with cold at zero, though it will thicken and turn a little milky in appearance. It is warranted not to corrode on brass or rust on steel, and it will not glue on the finest watch. Ezra Kelley, of New Bedford, Mass., has made it a business for many years to put it up for watch use, and has led in the market, while B. H. Tisdale, of Newport, R. I., and I. M. Bachelder, of Boston, are getting quite popular in the European market.

Caleb Cook, youngest son of Solomon, from scientific experiments did discover, about the year 1842, that the melon-oil of the blackfish was far superior to the jaw-oil in every respect—so much so that Mr. Kelley, who had about this time become very popular in preparing this oil for the trade, would not buy it until he was told what it was produced from; and from that time to the present, 1876, Caleb Cook's blackfish-melon (watch) oil has been refined by Kelley, of New Bedford, Bachelder, of Boston, Tisdale, of Newport, and many others on a smaller scale, for the world's use. Since the year 1842, Caleb Cook, of Provincetown, Mass., claims to be the only person who understands the art of producing this oil free from all glutinous matter and fit for use. This, he says, is done by a process known only by himself—not by mixing other oils or liquids with it, but by extracting all the acid and gluten from it, and leaving the oil pure for the finest and most delicate machinery. This, he says, cannot be done by the chilling and straining process; for when it becomes perfectly transparent at zero, the lubricating properties are all gone, the oil runs off the pivots, spreads on the plates, dries up, the pivots cut, turn red, and the oil is worse than worthless, for the valuable timekeeper is no longer what it was once for the want of oil with more substance and lubricating properties.

Porpoise-jaw oil and blackfish-melon oil are worth from \$5 to \$15 per gallon, according to supply. These oils are sold under the above trade-names, and also under the names "watch-oil" and "clock-oil". They are used largely by manufacturers of firearms, watches, and philosophical apparatus. Smith & Wesson, of Springfield, Mass., the Ethan Allen factory, at Worcester, Bye & Johnson, of Worcester, the Howard Watch Company, the Elgin Watch Company, the Waltham Watch Company, and the clock-factories in Connecticut, use them constantly. The philosophical-instrument makers use them for air-pumps, as they keep the leather always soft and pliable. Telegraph-instrument makers

use them when they can get them. They are used in government light-houses for the clocks of revolving lights. The color of the oils is very light, and can be made very white by placing in the window, where they will bleach in a short time. One drop of water in one pint of the oil will injure it very much.

It may be interesting to know how those fish or whales are taken. They make their appearance about the shores of Cape Cod and Barnstable Bay from early in the summer until early in winter; and when it becomes known that a shoal of blackfish is in the bay, the boats are manned and proceed at once to get in their rear; and, as the fish are at the surface of the water the most of the time, it is easy to tell how to manage to keep them between the boats and the shore. While in this position the men in the boats will make all the noise with their oars they can, and that will cause them to go in the opposite direction from the boats and toward the shore; and when the fish find that they are in shoal water, by seeing the sandy bottom, they become alarmed, and go with all their might till they run fast aground on the sand. The boats then row in their midst; the men with lance in hand jump out of their boats into the water, and butcher them as a butcher would a hog, and it becomes one of the most exciting occasions that it is possible to imagine, for the water flies in every direction, and the blood flows freely until death puts an end to the great tragedy. When the water ebbs and leaves them dry, their blubber is taken off, cut in slices, and the oil tried out. About thirty gallons upon an average is what one fish will make, and the melons will average about six quarts. The melons are taken from the top of the head, reaching from the spout-hole to the end of the nose, and from the top of the head down to the upper jaw. When taken off in one piece, they represent a half watermelon, weighing about twenty-five pounds. When the knife is put into the centre of this melon, the oil runs more freely than the water does from a very nice watermelon—hence the name melon-oil.

About the same time that the blackfish made their appearance in our waters, another of the whale species made its appearance also, called by the fishermen "cowfish" and by the historian "grampus". These whales are very much in the shape of the blackfish, only smaller, not so fat, and not so dark-colored. The oil from the melon of this fish is thought to be superior to anything yet found in the blackfish or the porpoise. It is of a very yellow color, and when reduced by the chilling and straining process it appears to have all the body and lubricating properties that are wanted for the very best watch-oil; but as it will take one year to determine it by practical experiments, it is thought best to keep it out of the market for the present.

This fish has made its appearance in our waters but three or four times in the last forty years, or about once in ten years. The method of taking it is the same as for the blackfish.

THE CRAIG FLOUNDER OF EUROPE. *GLYPTOCEPHALUS CYNOGLOSSUS*, ON THE COAST OF NORTH AMERICA.

By G. BROWN GOODE and TABLETON H. BEAN.

An unfamiliar pleuronectoid fish was found in our waters, in 1877, by the United States Fish Commission (Prof. S. F. Baird, Commissioner). Numerous specimens were trawled in the deep water off Salem, Mass., on La Have Bank, and on the coast of Nova Scotia, off Halifax, in Halifax Harbor, and in Bedford Basin, Halifax.

A careful study proves that they belong to a well-known European species, the *Pleuronectes cynoglossus* of Linné, lately referred by Professor Gill to the genus *Glyptocephalus* of Gottsche. We also discover the identity of this species with *Glyptocephalus acadianus*, described by Gill, from a single specimen (No. 12685), taken by the Commission in 1872, from the herring-weir on Treat's Island, Eastport, Me.

Below are given detailed measurements of twenty-two individuals, including authentically named European specimens from the University of Christiania, and the Bonaparte Collection, the type of *G. acadianus*, three specimens from Massachusetts Bay, five from La Have Bank, and eleven from the vicinity of Halifax.

The genus of Gottsche was carefully redescribed by Professor Gill in 1873,* and at the same time was published a full specific description of the Eastport specimen. Although this description is founded upon an individual which is among the most elongate of the series before us, it is thoroughly satisfactory for all, if the tendency to variation in the following particulars be noted.†

(1) *Height of body*.—This is stated to be about $2\frac{4}{5}$ of length exclusive of caudal, and $3\frac{1}{4}$ in total length. In the series studied, the proportions of this element varied, stated in units of hundredths of total length (including caudal), from 0.245 to 0.375, No. 12685 having it 30. An equally wide variation in the European fish is recorded by Parnell.‡

The *Pleuronectes elongatus* of Yarrell is not nearly so elongated as No. 21061 *a* (the figure of Couch has height about 0.275); and since no other diagnostic characters have been described, we place it without hesitation in the synonymy of *G. cynoglossus*.

(2) *Height of caudal peduncle*.—This element is subject to very slight variation, measuring usually 0.07 of total in both European and American specimens. The most elongate, slender forms have it slightly narrower. In No. 12685 it measures 0.06, and 0.065 in No. 21001 *b*.

(3) *Length of head*.—This varies from 0.15 to 0.175. In No. 12685 the

* On a new American species of Pleuronectoid (*Glyptocephalus acadianus*). By Theodore Gill, M. D. <Proceedings of the Academy of Natural Sciences, Philadelphia, 1873, pp. 360-362.

† Instead of having its radial formula D. 110 ; A. 100, as stated in the description, No. 12685 has it D. 107 ; A. 96.

‡ Fishes of the Frith of Forth, p. 210, pl. xxxviii, and in Memoirs of the Wernerian Society, vii, p. 370.

length is 0.15, and in the European specimens 0.15 and 0.1575 (Christiana specimen). The smallest proportion is represented by specimens from Massachusetts Bay and Halifax.

(4) *Teeth*.—In number these are extremely variable. No. 12685, according to Gill, had on the blind side 17 above and 20 below, on the eye side 6 above and 7 below. A Salem specimen, larger and older, had on the blind side, above 26, below 28, on the eye side, above 13, below 14. In young individuals, the teeth present the characters described by Gill, having the teeth on the eyed side conical and separated. This peculiarity disappears with age, all large specimens showing closely set incisorial teeth upon both sides of each jaw.

(5) *Length of pectoral*.—This is extremely variable within limits of 0.09 and 0.14. This measurement refers to the fin upon the colored side. Its shape is also variable; it is sometimes pointed, sometimes obtuse, owing to difference in comparative length of the upper rays. It is usually black, with a narrow whitish tip. The number of rays varies from 9 to 14.

(6) *Length of ventrals*.—This is also extremely variable on both sides. The range on the blind side is 0.0475 to 0.07, and on the eyed side 0.056 to 0.0775. The difference between the length of the two fins upon the same individual varies from 0.0025 to 0.0155.

(7) *Contour of lateral line*.—In some individuals this is essentially straight, in others considerably arcuated above the pectoral. This appears to be an individual variation. The two European specimens show a perceptible difference in this respect. In his diagnosis of *Pleuronectes cynoglossus*, Dr. Günther states that the lateral line is straight, without curve.

(8) *Position of the eyes*.—Dr. Günther states that in *P. elongatus* the upper eye is in advance of the lower. This is doubtless quoted from Yarrell. Neither the figure of Yarrell nor that of Couch indicates any such character.

(9) *Scales in lateral line*.—The number on the blind side ranges from 109 to 150, on the eye side from 110 to 140, there being no relation between the different sides of the same fish.

(10) *Radial formula*.—In the dorsal this ranges from 102 to 120; in the anal, from 87 to 100. There is no apparent relation between the number of rays and the relative proportions of height and length of body. A large number of rays in the dorsal is usually accompanied by a relatively large number in the anal.

(11) *Transverse rows of scales*.—Their number above and below the lateral line is nearly equal. The range is about from 40 to 50. There appears to be no relation of number of transverse rows to comparative height of body.

The thermal range of the species appears to be defined nearly by the limits 34° and 45° F.

The synonymy of the genus and species stands somewhat as follows:—

GENUS.

Glyptocephalus, GOTTSCHÉ, Archiv für Naturg. i, 1835, p. 156.—BLEECKER, Compt. Rend. Acad. Sci. Amsterdam, xiii.—GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 360.

SPECIES.

Glyptocephalus cynoglossus (Linné) Gill.

Pleuronectes oculis a dextris totus glaber, ARTEDI, Gen. 14, N. 3; Mus. Ichth. No. 39; Synon. p. 31, N. 3.

Pleuronectes cynoglossus, LINNÉ, Syst. Nat. ed. x, i, 1758, p. 269; ed. xii, 1766, i, p. 456.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 449.

Glyptocephalus cynoglossus, GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 361.

Pleuronectes pola, LACÉPÈDE, Hist. Nat. Poiss. (Suites à Buffon), 1819, iv, p. 401.

Platessa pola, CUVIER.—PARNELL, Nat. Hist. Fish. Frith of Forth, 1838, p. 210, pl. xxxviii.—YARRELL, Hist. Brit. Fish. 1841, ii, p. 315.—COUCH, Fishes British Islands, iii, 1864, p. 190.

Pleuronectes saxicola, FABER, Isis, 1828, p. 877.

Glyptocephalus saxicola, GOTTSCHÉ, l. c.

Pleuronectes nigromanus, NILSSON, Prodr. Ichth. Scand. 1832, p. 55.

Platessa clongata, YARRELL, *op. cit.* p. 318.—GÜNTHER, *op. cit.* p. 450.—COUCH, *op. cit.* p. 193.

Glyptocephalus clongatus, GILL, *op. cit.* p. 362.

Glyptocephalus acadianus, GILL, *op. cit.* p. 361, and in BAIRD'S Report on Fisheries of South Coast of New England, 1873, p. 794.

Dr. Günther suggests that the fish first cited by Fabricius (*Fauna Groenlandica*, p. 163), under the name of *Pleuronectes cynoglossus*, and subsequently named by him *Pleuronectes pinguis* (Afhandling. Kongel. Danske Videnskabernes Selskabs, Naturvid. og Math., Copenhagen, vol. i, 1824, p. 45), is probably identical with this species. The true relations of the Greenland fish have already been pointed out by Professor Gill (Proc. Acad. Nat. Sci. Phila. 1864, p. 218), as well as the curious misapprehension by which the synonymy of *P. pinguis* and the halibut has been confounded.

The following tables give detailed measurements of twenty-three specimens, and a list of all the specimens in the National Museum:—

TABLE I.—*Catalogue of specimens in National Museum.*

Catalogue number.	Number of specimens.	Locality.	When collected.	From whom received.	Nature of specimen.
21000	13	Massachusetts Bay, off Salem...	Aug. —, 1877	United States Fish Commission.	
21001	11	La Have Bank	do	do	
21005	2	Halifax	do	do	
21017	3	27 miles south by west from Chebucto Head.	Sept. 6, 1877	do	
21019	20	Halifax	Sept. 4, 1877	do	
21032	1	do	Sept. 11, 1877	do	
21047	2	Halifax (trawl 113 and 114)	Sept. 24, 1877	do	
21056	4	Massachusetts Bay	Aug. 6, 1877	do	Young.
21057	1	do	do	do	Do.
21058	2	Massachusetts Bay (trawl 32, 90 fathoms).	Aug. 14, 1877	do	Do.
21059	1	Halifax (trawl 54)	Aug. 25, 1877	do	Do.
21060	1	Halifax (trawl 41)	Aug. 21, 1877	do	Do.
21061	3	27 miles off Chebucto (trawl 83) ..	Sept. 6, 1877	do	Do.
210-2	1	Halifax (rawl 106, 111 fathoms) ..	Sept. 20, 1877	do	Do.
21063	1	Bedford Basin (trawl 111, 37 fathoms).	Sept. 21, 1877	do	Do.
10068	1	Europe		Bonaparte Collection	
17355	1	Christiania, Norway		Norwegian Government	
12685	1	Eastport, Mo	Aug. —, 1872	United States Fish Commission.	

TABLE II.—*Measurements.*

Current number of specimen	10,068	17,355	21,000 <i>a</i>	21000 <i>b</i>	21,000 <i>c</i>	12,685	21,001 <i>a</i>
Locality	Europe, Bonaparte Coll.	Christiania, Swedish Coll.	Massachusetts Bay.	Massachusetts Bay.	Massachusetts Bay.	Eastport.	La Have Bank.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches..	15.75	15.15	17.25	19	23	9.5	9.9
Body:							
Greatest height	0.315	0.33	0.34	0.325	0.34	0.30	0.307
Least height of tail	0.07	0.07				0.06	
Head:							
Greatest length	0.15	0.156	0.155	0.15	0.165	0.05	0.16
Length of maxillary	0.035	0.0375				0.035	
Length of mandible	0.05	0.05				0.05	
Diameter of orbit	0.05	0.05				0.05	
Pectoral:							
Distance from snout	0.16	0.16				0.16	
Length	0.09	0.105				0.10	
Ventral:							
Distance from snout	(0.19)	0.18				0.17	
Length (blind side)	0.05	0.056		0.051	0.055	0.06	0.052
(eye side)	0.056	0.062		0.057	0.057	0.065	0.065
Dorsal	112	103	112	110	110	107	101
Anal	99	87	90	93	91	96	87
Pectoral	11	11	12	11	13	12	11
Ventral	6	6	6	6	6	6	6
Number of scales in lateral line (blind side)	117	114	150	138	136	128	113
(eye side)	115	116	140	133	134	118	117

TABLE II.—*Measurements*—Continued.

Current number of specimen	21,001 <i>b</i>	21,001 <i>c</i>	21,001 <i>d</i>	21,001 <i>e</i>	21,005 <i>a</i>	21,005 <i>b</i>	21,017	21,047 <i>a</i>
Locality	La Have.	La Have.	La Have.	La Have.	Halifax.	Halifax.	Halifax.	Halifax.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches	10.2	11.5	12	12.25	15.75	19	16.25	19
Body:								
Greatest height	0.295	0.299	0.33	0.325	0.37	0.35	0.336	0.32
Least height of tail	0.065							
Head:								
Greatest length	0.16	0.16	0.165	0.16	0.155	0.155	0.157	0.155
Length of maxillary	0.04							
Length of mandible	0.06							
Diameter of orbit								
Pectoral:								
Distance from snout								
Length								
Ventral:								
Distance from snout								
Length (blind side)	0.052	0.047		0.055	0.053	0.047	0.055	0.057
(eye side)	0.065	0.058		0.065	0.062	0.063	0.06	0.063
Dorsal	115	110	107	113	105	120	106	111
Anal	97	95	88	98	92	100	90	95
Pectoral	11	11	12	13	12	11	12	10
Ventral	6	6		6	6	6	6	6
Number of scales in lateral line (blind side)	112	130	115	117?	109	133	125	127
(eye side)	119	128	110	117?	115	127	128	125

Current number of specimen	21,017 <i>b</i>	21,019 <i>a</i>	21,019 <i>b</i>	21,019 <i>c</i>	21,019 <i>d</i>	21,019 <i>e</i>	21,032	21,061 <i>a</i>
Locality	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches	24.25	21.5	19	20	20.25	19	19.25	114 <i>mm.</i>
Body:								
Greatest height	0.37	0.365	0.375	0.316	0.33	0.34	0.365	0.245
Least height of tail		0.07	0.07					0.055
Head:								
Greatest length	0.175	0.16	0.156	0.152	0.155	0.15	0.175	0.165
Length of maxillary		0.03	0.03					0.045
Length of mandible		0.05	0.05					0.06
Diameter of orbit		0.05	0.05					0.06
Pectoral:								
Distance from snout		0.157	0.160					0.17
Length		0.14	0.11					0.08
Ventral:								
Distance from snout		0.17	0.17					0.20
Length (blind side)	0.047	0.07	0.057	0.065	0.055	0.05	0.067	0.055
(eye side)	0.06	0.077	0.067	0.075	0.06	0.06	0.077	0.055
Dorsal	106	109	113	106	114	102	106	104
Anal	92	98	99	91	97	87	90	87
Pectoral	12	12	11	11	11	11	11	14
Ventral	6	6	6	6	6	6	6	6
Number of scales in lateral line (blind side)	117	117	130	132	131	119	129	
(eye side)	122	121	130	117	127	145	125	

NOTE ON SHELLS FROM COSTA RICA KITCHEN-HIDDEN, COLLECTED BY DRS. FLINT AND BRANSFORD.

By W. H. DALL.

In their archaeological explorations in Costa Rica, while examining the shell-mounds of Calebra near the western coast, a number of shells were obtained from the mounds to exhibit the species of which the shell-heaps were composed. They are, of course, in a semi-fossil condi-

tion and usually broken, but the following species have been identified :—*Phyllonotus nigratus* Mensch., *Strombus gracilior* Sby., *Arca grandis* Brod., *Chione dionæa* Menke, *Cardium procerum* Sby., and *Cardium consors* B. & S. These species, which formed part of the food-supply of the former inhabitants, are abundant in the fauna of the Gulf of California at the present day.

FEBRUARY 22, 1878.

ARSENIC ACID FOR PROTECTING ANATOMICAL PREPARATIONS FROM INSECTS.

By J. B. S. JACKSON, M. D.

Arsenic acid is most intensely strong, and comes in the form of a solid and of a liquid, and the two are of about equal strength. Half an ounce (avoirdupois) of the one, or one-half of a fluid-ounce of the other, is to be added to a pint (f $\frac{3}{4}$ xvj) of soft water, and it is ready for use. Any membranous preparation that is to be distended and dried, as a portion of the alimentary canal, any of the hollow organs, an ovarian cyst, an aneurism, and many preparations that are not to be distended, will be most thoroughly protected, I believe, by the arsenical solution. A solution of corrosive sublimate will probably prove an equal protection; but the membrane, when dried, has a disagreeably opaque and ash-colored look, whereas, after the arsenical solution, it dries without any change. I cover the preparation fairly with the solution, and leave it for about twenty minutes, then take it out, let it drain, then inflate or distend it, and, lastly, hang it up to dry.

BOSTON, MASS., February 19, 1878.

THE OCEANIC BONITO ON THE COAST OF THE UNITED STATES.

By G. BROWN GOODE and TABLETON H. BEAN.

A specimen of the Oceanic Bonito, *Orcynus pelamys* (Linné) Poey, was captured off Provincetown, Mass., in July or August, 1877, and taken to the Museum of Comparative Zoölogy by Mr. James H. Blake. The specimen was lent to the Fish Commission for study. Drawings have been made, and a table of measurements and description are here presented.

The specimen measures 447 millimetres (17.6 inches) to the end of the caudal carina. In form it closely resembles *Orcynus alliteratus*. The caudal rays are frayed, and their length cannot be exactly determined. The height of the body is a trifle more than one-fourth (0.26) of the length. The circumference of the body (0.71) is equal to the distance from snout to origin of anal (0.70). The length of the head (0.30) is

contained $3\frac{1}{3}$ times in length of body. The width of the interorbital region (0.075) is as much less than the length of snout (0.08) as it is greater than the length of the operculum (0.07). The length of the maxillary (0.11) is nearly equal to that of the ventral (0.115), and more than double the diameter of the orbit (0.05). The length of the mandible (0.14) is double that of the operculum.

The distance of the first dorsal fin from the snout (0.34) is slightly greater than that of the pectoral (0.325), and less than that of the ventral (0.38) by a distance nearly equal to the diameter of the orbit; it is also a trifle less than half the distance from the snout to the origin of the anal (0.70).

The length of the first dorsal spine (0.145) is double the length of the longest anal ray (0.0725). The distance from the origin of the first dorsal to the end of the base of the second dorsal (0.36) is four times the length of the anal base (0.09).

The length of the pectoral (0.15) is less than half its distance from the snout (0.325), and exactly half the length of the head; it is contained $6\frac{2}{3}$ times in the length of the body; its origin is slightly in advance of the origin of the dorsal, while its extremity reaches to the vertical from the tenth dorsal ray.

The length of the ventral (0.115) is about one-third that of the distance of the first dorsal from the snout.

The corslet is very prominent. Its contour is defined by lines beginning at the edge of the branchial cleft, about midway between the axil of the pectoral and the median line of the belly, extending below, beyond, and around the extremity of the pectoral (which, when normally placed, touches with its tip the outer margin of the corslet), then extending beyond its tip for a distance nearly equal to its length, round up into the lateral line, down which a narrow tract of scales continues to its extremity, though narrowed to a single row after passing its curve; passing the lateral line, the contour of the corslet curves forward and inward, then ascending to a point distant from the median line of the back about the diameter of the orbit, it follows backward in a direction parallel to this line, to a point opposite the posterior extremity of the second dorsal, where it curves upward to the median line of the body, and completes its circuit.

When viewed from above, the rows of scales appear to be arranged concentrically about the origin of the first dorsal fin. The scales are largest along the edges of the pectoral arch and the dorsal fin, decreasing rapidly in size as they recede from these regions. There are about thirty rows between the dorsal and the upper margin of the pectoral, normally placed.

Radial Formula.—D. XIV, 2 + 12, VIII. A. 2 + 12, VII. P. 28. V. 6.

Color.—The upper parts must have been deep blue in life; the belly and flanks below lateral line, the opercles, and throat, pearly opalescent white. The lower part of the pectoral arch and tracts at the base of

the ventrals and anal, as well as those parts of the opercles where the bone is close to the outer skin, were of a chalky white. The corslet is bronzed brown in the alcoholic specimen.

There are four distinct bluish lines upon the sides, which are nearly parallel with the lateral line, and which constitute the most prominent specific character. The first of these begins directly under the tip of the pectoral, the second at the margin of the corslet, at a point in the line from the upper to the lower axillary angles of the pectoral. The third and fourth are rather indistinct anteriorly, but are very distinct in the posterior half of the body, and are about as far distant from each other as are the first two, the interval between the two pairs being slightly greater than that between the members of each pair, and equal to the diameter of the orbit. The first or uppermost line is nearly straight, the others, following the lower contour of the body, curve upward over the anal fin, and all four become lost in the darker color of the caudal peduncle.

This is without doubt the *Scomber Pelamis* of Linné, characterized by him as "*Scomber pinnulis inferioribus VII, corpore lineis utrinque quatuor nigris*" (Syst. Nat. ed. 10, 1758, i, p. 297), and given by Günther as *Thynnus pelamys* (Cat. Fish. Brit. Mus. ii, 1860, p. 364). It is hopelessly confused by Cuvier and Valenciennes with *Pelamys sarda*. Professor Poey assigned it to its present generic relations in 1868 (Syn. Pisc. Cubeus. p. 362).

The geographical distribution of this species is not very well known, owing to the uncertainty of its synonymy. The British Museum has two stuffed specimens, one from the Cape Seas, and one from Yarrell's Collection of British fishes. Couch records it from the Frith of Clyde (July), and from Cumberland, England, and Ireland. Poey has it from Cuba. It has also been recorded from the seas of India and China.

The presence of this form upon our coast was first suggested by Messrs. E. G. Blackford and Barnet Phillips of New York, who recognized the species in New York Market from the plates in Couch's History of British Fishes. Only one was seen, and it was unfortunately not preserved. This was in the summer of 1873; and as none have since been found, it may be said, with some certainty, that the species is at present only accidental in our fauna.

DISTRIBUTION OF CALIFORNIAN TERTIARY FOSSILS.

By W. H. DALL.

Further information has been received from Mr. Hemphill in regard to the Tertiary fossils enumerated lately in these Proceedings. These facts, having an important bearing on geological and faunal changes, are now summarized.

STRATA OF THE SAN DIEGO PENINSULA.

The long, low, narrow strip of land lying between San Diego Bay and the ocean is locally known as the Peninsula. It appears to have been pierced formerly by narrow channels or outlets by which the waters of the bay communicated with the sea, and even now, in heavy storms, the surf breaks over the barrier. At high-water mark is a stratum about four feet thick, containing fossils mingled in a confused manner, above which is a bed of fine sand extending to the surface of the peninsula, and having a total thickness of some twelve feet. From the lower bed (A) were obtained the following species:—

<i>Corbula luteola.</i>	<i>Drillia Hemphillii.</i>
<i>Tellina modesta.</i>	<i>Mangilia angulata.</i>
<i>Lucina Nuttallii.</i>	<i>Odostomia gravis.</i>
<i>Pecten paucicostatus.</i>	<i>Turbonilla chocolata.</i>
<i>Nucula exigua.</i>	<i>Turbonilla virgo.</i>
<i>Rhynchotaxis punctocaelata.</i>	<i>Turbonilla torquata.</i>
<i>Tornatina crealis.</i>	<i>Eulima micans.</i>
<i>Tornatina eximia.</i>	<i>Scalaria indianorum.</i>
<i>Volvula cylindrica.</i>	<i>Cerithiopsis assimillata.</i>
<i>Melampus olivaceus.</i>	<i>Olivella biplicata.</i>
<i>Dentalium hexagonum.</i>	<i>Olivella boetica.</i>
<i>Vitrinella sp.</i>	<i>Nassa fossata</i> var.
<i>Crucibulum spinosum.</i>	<i>Nassa perpinguis.</i>
<i>Crepidula adunca.</i>	<i>Neverita</i> , var. <i>alta.</i>
<i>Serpulorbis squamigerus.</i>	<i>Nitidella Gouldii.</i>
<i>Litorina scutulata.</i>	<i>Amphissa versicolor.</i>
<i>Lacuna solidula.</i>	<i>Pteronotus festicus.</i>
<i>Rissoina Woodwardi?</i>	Fish teeth and a sp. of <i>Serpula.</i>
<i>Myurella simplex.</i>	

From the sand bed (B) were obtained,—

<i>Periploma argentaria.</i>	<i>Macoma nasuta.</i>
<i>Macoma secta.</i>	<i>Mactra californica.</i>
<i>Macoma indentata.</i>	

In the lowest part exposed of bed A are found *Cardium procerum*, *Dosinia ponderosa*, and *Anomia limatula*, but they do not seem to be scattered through the general body of the stratum.

STRATA OF THE MAINLAND.

On the mainland near the town of San Diego, the land is rather low, gradually rising inland toward some bluffs. To the eastward of the town, or what is known locally as the "railroad land", a stratum (A²) four or five feet thick is exposed at high-water mark, and, like the stratum A of the peninsula, contains a confused aggregation of fossils, at the bottom of which is a layer of the upper valves of *Anomia lima-*

tula, hardly mixed with any other species, and containing, so far as could be discovered, no perfect specimens or lower valves.

Stratum A² is regarded by Mr. Hemphill as the outcropping of an extensive formation probably underlying the whole of the level land back to the bluffs, and presenting estuarine characters. It is surmounted by, or passes into, a fine sandy deposit (B²), at least seventy feet thick in some places, containing fossils scattered through it, and it is in this stratum that the fossils from the well were found. In nearly all the wells that have been sunk in San Diego, fossils have been found, showing that the bed is of wide extent as well as of great thickness.

The following fossils were afforded by stratum A²:—

<i>Pholadidea oroidea.</i>	<i>Cardium procerum.</i>
<i>Solecurtus californianus.</i>	<i>Ostrea lurida.</i>
<i>Macoma sabulosa?</i>	<i>Anomia limatula.</i>
<i>Tellina Bodegensis.</i>	<i>Fissurellidea callomarginata.</i>
<i>Donax flexuosus.</i>	<i>Crucibulum spinosum.</i>
<i>Maetra falcata.</i>	<i>Cerithidea sacrata.</i>
<i>Clementia subdiaphana.</i>	<i>Drillia penicillata.</i>
<i>Chione simillima.</i>	<i>Scalaria indianorum.</i>
<i>Chione succincta.</i>	<i>Ranella murieiformis.</i>
<i>Dosinia ponderosa.</i>	<i>Nassa fossata.</i>
<i>Saxidomus aratus jun.</i>	<i>Nassa tegula.</i>
<i>Petricola pholadiformis?</i>	<i>Cerostoma Nuttallii.</i>

From the well-digging in stratum B² came,—

<i>Venericardia monilicosta.</i>	<i>Crepidula princeps.</i>
<i>Arca microdonta.</i>	<i>Turritella Cooperi.</i>
<i>Leda coelata.</i>	<i>Turbonilla styliua.</i>
<i>Pecten expansus.</i>	<i>Nassa mendica.</i>
<i>Janira dentata.</i>	<i>Cylichna alba.</i>
<i>Mamma nana.</i>	<i>Cadulus fusiformis.</i>

To which may be added the following species not enumerated from that locality in the list (pp. 11-12) in these Proceedings, but also obtained by Mr. Hemphill:—

<i>Glottidia albida</i> Hds.	<i>Lucina tenuisculpta</i> Cpr.
<i>Xylotrya</i> sp. (tubes).	<i>Cryptodon flexuosus</i> Mont.
<i>Cryptomya californica</i> Conr.	<i>Modiola recta</i> Conr.
<i>Solen rosaceus</i> Cpr.	<i>Nucula exigua</i> Sby.
<i>Solecurtus californianus</i> Conr.	<i>Acila Lyallii</i> Bd.
<i>Macoma expansa</i> Cpr.	<i>Pecten hastatus</i> Sby.
<i>Clementia subdiaphana</i> Cpr.	<i>Janira florida</i> Hds.
<i>Cardium centifilosum</i> Cpr.	<i>Ostrea conchaphila</i> Cpr.
<i>Lucina Nuttallii</i> Conr.	<i>Placunanomia macroschisma</i> Desh.
<i>Lucina acutilineata</i> Conr.	<i>Tornatina eximia</i> Bd.

Cyllichna cylindracea Linn.
Dentalium hexagonum Sby.
Dentalium semipolitum B. & S.
Siphonodentalium pusillum? Gabb.
Calliostoma annulatum Martyn.
Galerus filiosus Gabb.
Crepidula navicelloides Nutt.
Turritella Jewettii Cpr.
Bittium asperum Cpr.
Myurella simplex Cpr.
Drillia (four sp. undet.).
Surcula Carpenteriana Gabb.
Mangilia variegata Cpr.
Mangilia (four sp. undet.).
Clathurella Conradiana Gabb.
Odostomia straminea Cpr. var.
Odostomia sp.

Turbonilla torquata Cpr.
Eulima rutila Cpr.
Scalaria subcoronata Cpr.
Cancellaria (four sp. undet.).
Neverita Recluziana Petit.
Sigaretus debilis Gld.
Ranella Mathewsonii Gabb.
Olivella boetica Cpr.
Nassa fossata Gld.
Astyris tuberosa Cpr.
Astyris sp.
Ocenebra lurida Cpr.
Pteronotus festivus Hds.
Trophon orpheus Gld.
Colus Dupetitthouarsi? Kien.
Volutopsis (sp. undet.).
Chrysodomus Diegoensis Dall.

About ten miles northward from San Diego, on the seacoast of California, are beds of coarse sandstone, of considerable thickness, dipping to the northward. About twenty feet of it (stratum C) are fossiliferous, containing the shells, not aggregated in a confused mass, as in some other cases above mentioned, but distributed much as they might have been while living. According to Mr. Hemphill, these fossils have not the aspect of an estuary deposit, but rather that of animals living in the open sea. *Pecten expansus* occurring in both the well (B²) formation and this sandstone, Mr. Hemphill supposes that they may be of identical age, but that the different assemblage of species may be due to the one being formed in an estuary and the other on an open coast. This sandstone bed contained, among others, the following species:—

Pecten islandicus.
Pecten hericcus.
Pecten ventricosus.
Pecten expansus.
Pecten Stearnsii.
Pecten Hemphillii.
Pecten aquisulcatus var

Ostrea Veatchii.
Lucina acutilineata.
Opalia anomala.
Opalia varicostata.
Scalaria tineta.
Scalaria Hemphillii

Adjoining bed C, and composed of recent alluvial soil, eight or ten feet above tide-water, is another stratum (D), in which the specimens are in a poor state of preservation, and nearly all found living near San Diego at the present time. This bed afforded,—

Laqueus californicus.
Cumingia californica.
Tapes staminea.
Lucina acutilineata.

Axinea profunda.
Acmca mitra.
Acmca insessa.
Fissurella volcano.

Chlorostoma Pfeifferi.
Surcula Carpenteriana.
Conus californicus.
Neverita Recluziana.

Mitra maura.
Monoceros engonatum.
Purpura crispata.
Fusus Harfordi.

Near Santa Barbara, the outcrop (C²) upon the seabeach afforded a few fossils, some of which were similar to species obtained from the San Diego well. Among these were the following, all recent species:—

Venericardia monilicosta.
Bittium quadrifilatum.
Bittium asperum.
Lacuna vineta.

Astyris gausapata.
Amphissa versicolor.
Trophon orpheus? jun.

The formation within whose limits the beds above described are to be included extends from the Pribiloff Islands southward, at least to Yesso Island, Japan, on the west, and to Chili on the east. A fruitful locality is at Cerros Island, Lower California, from whence *Waldheimia Kennedyi* Dall, and also a number of the species referred to in the preceding article, have been obtained, some of which are described by Gabb in the Paleontology of California.

Jurassic or Cretaceous beds appear to exist at Todos, Santos Bay, Lower California, not far from San Diego. Mr. Hemphill collected here, and has presented to the National Museum, half a dozen species not yet critically examined, but containing a fine specimen belonging to the *Rudistæ*, which have hitherto been hardly known as American fossils.

MARCH 2, 1878.

A REVISION OF THE AMERICAN SPECIES OF THE GENUS BREVOORTIA, WITH A DESCRIPTION OF A NEW SPECIES FROM THE GULF OF MEXICO.

By G. BROWN GOODE.

The type of the genus *Brevoortia* of Gill is the species described in 1802 by Latrobe under the name of *Clupea tyrannus*, and later by Mitchell under the name of *Clupea menhaden*. As has been already indicated,* the former name has the prior claim to adoption, and the species must be called *Brevoortia tyrannus*. Of this species, there appear to be two geographical races or varieties. One of these is the typical form of the Atlantic coast of the United States, the other a closely allied form from the coast of Brazil, already described by Spix under the name of *Clupanodon aureus*. For the northern form, the name of Mitchell should be retained, and the two varieties may be distinguished as *Brevoortia tyrannus* var. *menhaden*, and *Brevoortia tyrannus* var. *aureus*. On the coast of Patagonia and Paraguay occurs a well-marked species described by Jenyns under the name of *Alosa pectinata*. This species is readily

*Vide supra, p. 8.

distinguished by its larger scales, which are arranged in 18 to 20 lateral rows, instead of 25 to 27, as in *B. tyrannus*. The generic relations of this species were recognized many years ago by Professor Gill, and its name should stand as *Brevoortia pectinata*, (Jenyns) Gill.

A third species occurs in the Gulf of Mexico. It is distinguished by its larger head and fins. It appears to have never been described, and for this form the name *Brevoortia patronus* is proposed. It is accompanied by the same Crustacean parasite that is found in the mouths of *B. tyrannus*, to which Latrobe gave the significant specific name of *prægustator*.

Brevoortia tyrannus, (Latrobe) Goode.

Diagnosis.—Head and jaws short, the length of the head less than one-third of the length of the body, less the caudal fin, especially short in var. *aurea*; the maxillary in length much less than three-twentieths of the length of the body. Height of body about one-third of total length, in very fat individuals three-eighths. Fins comparatively short, the height of the dorsal less than length of maxillary, and considerably less than three-tenths of length of body, that of the anal usually less than half that of maxillary, that of ventral always less than one-tenth of total length, the length of middle caudal rays one-fifth that of body and less, that of exterior caudal rays usually about three-fourths, often less than two-thirds, and rarely more than five-sixths of total length. Fins all shorter in var. *aurea*. Insertion of ventral far behind tip of pectoral. Insertion of dorsal about equidistant from snout and base of middle caudal rays, but varying two or three one-hundredths to either side of the median point, and always slightly behind the vertical from insertion of ventrals.

Scales of medium size, much serrated, arranged very irregularly in 24–26 transverse and 60–80 longitudinal rows. Scales forming sheath at base of pectoral not large. Squamation of caudal lobes moderate.

Operculum strongly striated in var. *menhaden*, almost smooth in var. *aurea*.

Scapular blotch conspicuous.

This species is easily distinguished from *Brevoortia patronus* by its shorter head and fins, by its slenderer body, and its pectinated scales, and from *B. pectinata* by its smaller, less regularly arranged, and more numerous scales, and its shorter, less furcate caudal fin.

INDIVIDUAL VARIATIONS AND SPECIAL CHARACTERS.

Head.—The length of the head varies from 0.28 to 0.33. The posterior end of the maxillary extends to a point in the vertical from the centre of the orbit. The length of the skull, as indicated by the “distance from snout to nape”, varies from 0.19 to 0.23. The length of snout, measured from a line drawn perpendicularly through the centre of the orbit, varies from 0.09 to 0.11. The length of maxillary varies from

0.12 to 0.145; that of mandible from 0.15 to 0.18. The diameter of the eye enters $4\frac{1}{2}$ times in the length of the head. Its width varies from 0.11 to 0.15 in very fat individuals.

Shape of Body.—This is exceedingly variable, and the variation is caused largely by the fatness of the individual. In very plump ones, the expansion of the belly throws back the origin of the ventrals and anal, and greatly changes the appearance of the fish. In the specimens before me, the height of the body ranges from 0.31 to $0.38\frac{1}{2}$. The table of measurements subjoined shows the effect of increased height of body upon the other measurements of proportion.

Fins.—The range of variation in the position of the dorsal is indicated in the diagnosis. There is no appreciable correlation between the positions of the dorsal and anal in the same specimen. The insertion of the anal is distant from the snout from 0.68 to 0.75. The lengths of the rays in dorsal, anal, ventral, and caudal vary much, as the table of measurements indicates. In the caudal, the upper lobes vary from 0.16 to 0.25; the lower lobes from 0.18 to 0.27. The relation of the pectoral and ventral fins is much affected by the length of the head, the insertion of the former being thrown much further back in long-headed individuals.

Scales.—The degree of serration varies much in individuals as well as the squamation of the bases of the vertical fins and the number and regularity of the body-scales. In young individuals, the scales are arranged with much regularity; but, in adults, I have strong reason to believe that scales are intercalated here and there, throwing the arrangement into great disorder, and rendering an accurate enumeration impossible.

Varieties.—The series before me embraces some two hundred specimens of *Brevoortia tyrannus* of various ages, seasons, and localities. Almost every feature is subject to wide variations, and there is usually no decided correlation between different characters except that a long head is accompanied usually by long jaws, and a pectoral set farther back and extending more nearly to the insertion of the ventral. There are, however, certain groups of individuals which can be included within a diagnosis which may serve to distinguish them from all the others of the same species. To what extent it is desirable to define varieties which are not separated geographically, I am not well satisfied. The exact meaning of the terms "sub-species" and "variety" as employed by Cope, Coues, Gill, Yarrow, and other recent writers has not been definitely interpreted. It seems desirable, however, to designate in some way the limits of variation from the normal specific type in different directions. With this purpose, and premising that by a variety I mean simply a divergent form, connected by intermediate forms with the typical specific form, I have thought it desirable to name provisionally two varieties, and to call attention to others which may possibly exist. This is done with much hesitation, and only with a view to an attempt to

formulate the minor differences to be observed between fish of the same species on different parts of our coast. A precisely parallel case is to be found in the shad of the different Atlantic rivers, which are well known to exhibit strong distinctive marks. Very possibly every school of menhaden has its own characteristics. In every case where I have had an opportunity to observe them, the individuals composing the same school were closely similar to each other.

The typical form of the species as now defined is taken from the coast of Southern New England and the Middle States. It has the height of the body about one-third of the total length, the head three-tenths of the total length, or a little more, the maxillary long (0.14 to 0.14½) and exceeding the height of the dorsal.

The species described by Spix under the name of *Clupanodon aureus* cannot be distinguished by any apparent specific characters from *Brevoortia tyrannus*, since one or more of the specimens of the latter species before me partake of some of the peculiarities of the Brazilian form. There is, however, a general average of characters exhibited by the Brazilian specimens as well as by the figure of Spix, with which they closely agree, which seems to me to entitle them, for the present at least, to recognition as belonging to a distinct geographical variety. The distinctive characters appear to consist in (1) a greater average height of body; (2) a lesser length of head; (3) a lesser average length of maxillary and mandible; (4) a slightly lower anal and dorsal fin; (5) a greater average distance of anal from snout; (6) a greater average length of the middle caudal rays; (7) a shorter average pectoral; (8) a more regular arrangement of the scales, and a more luxuriant growth of small scales at the bases of the fins.

A number of specimens from Noank, taken in 1874, vary quite as much from the normal type and in almost the same respect as the variety just described. The maxillary and mandible are shorter, however, than in the Brazilian form, the anal fin lower, and the lobes of the caudal are extremely short, sometimes hardly exceeding in length the pectoral fin. But for the fact that these specimens show almost all the characters of the Brazilian *Brevoortia*, and in some cases exaggerations of them, I should be inclined to consider the *aurea* a distinct species. Having with some hesitation allowed it the rank of a variety, the question must be decided as to the propriety of also allowing varietal rank to this peculiar form from Noank. The exact meaning of the terms *subspecies* and *variety* as recently employed by zoologists is not very clear to my mind, but I infer that a "variety" is composed of an assemblage of individuals varying uniformly from the typical specific form in a degree sufficient to be susceptible of description and definition, though not necessarily separated from it by the absence of connecting forms. Premising then that in giving to the Noank specimens a varietal name my object is simply to define the limits of variation from the normal

type in a given direction, I would provisionally propose that they be designated as variety *brevicaudata*.

The specimens from the Saint John's River, Florida, are extremely variable in every respect. Certain individuals show a tendency to elongation of the head and fins, and also a slenderness of the posterior part of the body, and nearly all the individuals from that region are more lightly and gracefully shaped. They all have a tendency to a yellow coloration, especially upon the caudal lobes. I have not felt justified, however, in calling it a variety.

I have not had an opportunity to study the Maine schools, but am inclined to believe that their differences are very perceptible.

Table of Measurements.

Current number of specimen	10,405 = 709 C. A. S.	10,405 = Orig. No. 247.	20,666 a.
Locality	Wood's Holl, Mass.	Wood's Holl, Mass.	Wood's Holl, Mass.
	Millim. 100ths.	Millim. 100ths.	Millim. 100ths.
	<i>Very fat.</i>	<i>Plump.</i>	
Extreme length	251	243	130
Body:			
Greatest height	38½	31½	34½
Least height of tail	9		
Length of caudal peduncle	9½		
Head:			
Greatest length	32	31	31
Distance from snout to nape	20	20½	20½
Greatest width	15		
Length of snout from perp. from centre of orbit	10	10	10½
Length of operculum	9	9	9
Length of maxillary	14½	14½	14
Length of mandible	17½	17¾	17
Distance from snout to centre of orbit	10½	10¼	10½
Dorsal:			
Distance from snout	54	51	49
Length of base	19	17½	17½
Origin of pectoral to origin of dorsal	41	33½	35½
End of dorsal to end of anal	25½	24	25
Length of longest ray	12½	11	12½
Length of last ray	6	7	6½
Anal:			
Distance from snout	73	72	72
Length of base	14	14½	15½
Origin of anal to origin of dorsal	39	33	36
Length of longest ray	6½	5½	6½
Length of last ray	5½	4½	4½
Caudal:			
Length of middle rays	5½	4½	5½
Length of external rays, superior	23	20½	20
interior	26½	23	23
Pectoral I:			
Distance from snout	30	32	30
Distance of tip from snout	48½	48	46
Length	19	17½	18
Length of longest axillary appendage	11		
Ventral:			
Distance from snout	53	53	51
Length	8½	7½	9
Origin of ventral to end of dorsal	38	31	33
Dorsal rays	18	20	20
Anal rays	21	20	21

Table of Measurements—Continued.

Current number of specimen.....	20,666 b.		18,049 b.		1,696 a.	
Locality	{ Wood's Holl, Mass.		{ Saint John's River, Florida.		{ Indian River, Florida.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	132	.....	140	.....	<i>Fat.</i> 196	
Body:						
Greatest height.....		34		34		37
Head:						
Greatest length.....		32		30		30
Distance from snout to nape.....		23		21		20
Greatest width.....		.....		11		.....
Length of snout from perp. from centre of orbit.....		11½		10		10
Length of operculum.....		9		9½		9
Length of maxillary.....		14½		13		13½
Length of mandible.....		17½		16		17
Distance from snout to centre of orbit.....		12		.....		.....
Dorsal:						
Distance from snout.....		53		49		50
Length of base.....		19		18		17
Origin of pectoral to origin of dorsal.....		35		34		36
End of dorsal to end of anal.....		24		26		30
Length of longest ray.....		12		12		13
Length of last ray.....		6		6½		5
Anal:						
Distance from snout.....		72		71		72
Length of base.....		15		16		16
Origin of anal to origin of dorsal.....		34		36		38
Length of longest ray.....		6½		8		*5+
Length of last ray.....		5		5		*3+
Caudal:						
Length of middle rays.....		6		6½		*4+
Length of external rays, superior.....		22½		24		*22
inferior.....		27		27		*24
Pectoral:						
Distance from snout.....		32		30		30
Distance of tip from snout.....		4½		47		.....
Length of longest axillary appendage.....		18		17		.....
Ventral:						
Distance from snout.....		52		50		50
Length.....		9½		9		.....
Origin of ventral to end of dorsal.....		33		33		35
Dorsal rays.....	20	.....	19	.....	18	.....
Anal rays.....	21	.....	20	.....	20	.....

Current number of specimen.....	5,152.		17,927.		19,046.	
Locality	{ West Florida.		{ Saint John's River, Florida.		{ Saint John's River, Florida.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length.....	101	.....	178	.....	230	.....
Body:						
Greatest height.....		38		34½		32
Least height of tail.....		.....		10		9
Length of caudal peduncle.....		.....		8		8
Head:						
Greatest length.....		29		31½		33
Distance from snout to nape.....		20		20½		20½
Greatest width.....		.....		12		14
Length of snout from perp. from centre of orbit.....		10		10		10½
Length of operculum.....		9½		9½		9½
Length of maxillary.....		13		14		14½
Length of mandible.....		15		18		18
Distance from snout to centre of orbit.....		.....		11½		10½
Dorsal:						
Distance from snout.....		48		52		52½
Length of base.....		18		21		17
Origin of pectoral to origin of dorsal.....		36		34½		34
End of dorsal to end of anal.....		30		26		25
Length of longest ray.....		.....		12		12
Length of last ray.....		.....		5		.....

* Broken

Table of Measurements—Continued.

Current number of specimen	5,152.		17,927.		19,046.	
Locality	{ West Florida.		{ Saint John's River, Florida.		{ Saint John's River, Florida.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Anal:						
Distance from snout				68		72
Length of base				16		16
Origin of anal to origin of dorsal				38		32½
Length of longest ray				6½		6
Length of last ray				5		6½
Caudal:						
Length of middle rays				5		5½
Length of external rays, superior				21		20
interior				23		24
Pectoral:						
Distance from snout				31½		32
Distance of tip from snout				49		50
Length				19		18
Length of longest axillary appendage				12		
Ventral:						
Distance from snout				49		48
Length				9		9
Origin of ventral to end of dorsal				33½		30
Dorsal rays	20		21		18 or 19	
Anal rays	21		21		21	

Current number of specimen	19,044.		18,049 a.		19,468.	
Locality	{ Saint John's River, Fla.		{ Saint John's River, Fla.		{ Virginia.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	192		144		234	
Body:						
Greatest height		34		34		32
Least height of tail						9
Length of caudal peduncle						9
Head:						
Greatest length		29		29		32½
Distance from snout to nape		19		19		20½
Greatest width		12		11		12
Width of interorbital area						7
Length of snout from perp. from centre of orbit		9½		10		10
Length of operculum		10		10		9
Length of maxillary		13		13		14
Length of mandible		16		16½		18
Distance from snout to centre of orbit		10		11		11
Dorsal:						
Distance from snout		49		49		51
Length of base		17		17		18½
Origin of pectoral to origin of dorsal		35		35		34
End of dorsal to end of anal		27		29		23
Length of longest ray		12		12½		11
Length of last ray		6		6½		5½
Anal:						
Distance from snout		71		71		72
Length of base		17		17½		14½
Origin of anal to origin of dorsal		34		37		33
Length of longest ray		6		7		5½
Length of last ray		5		4		6
Caudal:						
Length of middle rays		6		5		4
Length of external rays, superior				25		
inferior		23		27		24
Pectoral:						
Distance from snout		30		30		32
Distance of tip from snout		45		45		49
Length		16		17		18
Length of longest axillary appendage						12
Ventral:						
Distance from snout		49		50		51
Length		9		8½		9
Origin of ventral to end of dorsal		34		34		30
Dorsal rays	19		18		19	
Anal rays	23		21		21	

Brevoortia patronus, *sp. nov.*, Goode.

Diagnosis.—*Head* larger than in the other American forms, its length usually more than one-third that of the body, the maxillary about three-twentieths of the length of the body. *Height* of body always more than three-eighths of its total length, its anterior inferior profile cultrate, convex, giving an obtusely rounded profile to the subpectoral outline, and throwing the snout above the median horizontal axis of the body. *Fins* long and powerful; the height of the dorsal usually equal to the length of the maxillary, and about three-tenths of total length of body; that of the anal equal to or greater than half the length of the maxillary; that of the ventral one-tenth of body-length; length of middle caudal rays always more than one-fifth and often more than one-fourth the length of the head, that of the exterior rays almost equal in length to the head and rarely less than five-sixths of its length. Insertion of the ventral under or slightly posterior to the tip of the pectoral. Insertion of dorsal always posterior to a point on the dorsal outline, equidistant from the snout and the base of the medial caudal rays (sometimes as much as seven one-hundredths of total length), and always in advance of the vertical from the insertion of the ventrals.

Scales of medium size, with entire, fluted margins, arranged regularly (in young) in 24 to 25 transverse and 50 to 70 longitudinal rows. Scales forming sheath at base of pectoral very large, round. Squamation of caudal lobes inconspicuous. Axillary appendages large. Operculum smooth or very delicately striated. Scapular blotch inconspicuous.

The variations of individuals are sufficiently indicated in the subjoined table of measurements. The most characteristic specimens occur at Brazos Santiago, Tex., and the more northern specimens show a tendency to shortening up of the head, jaws, and fins.

*Description.**—The body is much compressed, especially below and in advance of the pectorals; the contour of the belly between the ventrals and the gill-opening is cultrate, projecting, obtusely rounded. The height of the body equals two-fifths of its length, and the least height of the body at the tail is one-fourth of its greatest height in front of the pectorals. The length of the caudal peduncle, from the end of the anal to the base of the exterior lobes of the caudal, is one-fifth of the height of the body, and one-twelfth (0.08) of its length.

The head is elongated and large, triangular; its length is more than one-third (0.35 and 0.34) that of the body, and its height at the nape is slightly more than its length. The length of the skull, as indicated by the distance from snout to nape, is about one-fourth (0.24 and 0.24½) of the length of the body, and the greatest width of the head (0.13) slightly exceeds the half of this. The width of the interorbital is about equal to the diameter of the orbit, and slightly more than one-fourth the length of the head. The maxillary reaches to the vertical from the posterior margin

* To avoid confusion, this is drawn up from the Brazos Santiago specimens, which are most characteristically developed.

of the pupil; the mandible nearly to the vertical from the posterior margin of the orbit. The length of the maxillary is about equal to that of the longest ray of the dorsal fin (0.15 to 0.16), that of the mandible (0.19) half the distance from the origin of the anal to the origin of the dorsal (0.38) or to the length of the base of the anal (0.18). The distance from the tip of the snout to the centre of the orbit (0.13 to 0.13 $\frac{3}{4}$) equals the greatest width of the head. The length of the operculum is equal to that of the eye: the opercular striations are fine, but distinct and numerous. The dorsal fin is inserted posteriorly to a point equidistant from the snout and the base of the caudal and in advance of the vertical from the insertion of the ventrals. Its length of base (0.20 to 0.21 $\frac{1}{2}$) is double that of the operculum. Its greatest height is nearly half the length of the head. It is composed of 19 rays, of which the third is the longest. Its upper edge is slightly emarginated. The height of the last ray (0.10) is equal to half the length of the base.

The distance of the anal from the snout is slightly less than three-fourths of the length of the body (0.70–0.72), its length of base (0.18–0.18 $\frac{1}{2}$) one-fourth of this distance. The distance from the origin of the pectoral to the origin of the dorsal (0.37–0.37 $\frac{1}{2}$) is about equal to that from the origin of the anal to that of the dorsal (0.38). Its height (.09–.09 $\frac{1}{2}$) is about half its length of base, its least height (at last ray) one-third of the same (.06–.05 $\frac{1}{2}$). The fin is composed of 22 rays, its edges slightly emarginated.

The caudal fin is much forked and elongate, the middle caudal rays (0.08) half the length of the maxillary, the exterior rays above (0.31–0.32) twice that length, the lower exterior rays (0.35–0.34) nearly equal to twice the length of the mandible.

The pectoral fin is strong, falcate, inserted under the angle of the suboperculum, at a distance from the snout (0.35–0.34) about midway to the insertion of the anal. Its tip extends beyond the insertion of the ventrals, its length (0.22) being nearly two-thirds that of the head. The axillary appendages are half as long as the fin, or more.

The distance of the ventral from the snout (0.54–0.55) is about the same as that of the dorsal, though by the contour of the body it is thrown slightly behind the point of dorsal origin. Its length (0.10) is equal to that of the last ray of the dorsal.

The scales are quite regularly arranged in about 24 to 25 horizontal and 50 vertical rows. Their free portion is narrow and high. They are entire at the edges, and fluted or crenulated. There are two rows of differentiated scales upon each side of the dorsal line, but they are scarcely pectinated. The scales forming the sheath at the base of the pectoral are large and round.

Color.—Silvery, with a brassy sheen upon the sides and greenish gray upon the back.

Table of Measurements.

Current number of specimen	892 a.		892 b.		891 a.		891 b.	
Locality	{ Brazos Santiago Texas.		{ Brazos Santiago, Texas.		{ Mouth of Rio Grande.		{ Mouth of Rio Grande.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	106		104		96		90	
Body:								
Greatest height		40½		40½		38		41½
Least height of tail		11		10		10		11
Length of caudal peduncle		8		8				7½
Head:								
Greatest length		35		34		33		33
Distance from snout to nape		24½		24		23½		23
Greatest width		13		13		11		11
Length of snout from perp. from centre of orbit								
.....		12		11½		12		11
Length of operculum		10		10		11		12
Length of maxillary		16		15¾		16		14½
Length of mandible		19		18½		19		18
Distance from snout to centre of orbit		13¼		13		12¼		13
Dorsal:								
Distance from snout		53		53½		51		52
Length of base		21½		20		17		19
Origin of pectoral to origin of dorsal								
.....		37		37½		37		39
End of dorsal to end of anal		25		26		26		28
Length of longest ray		15		16		14½		17
Length of last ray		16		9		7½		9
Anal:								
Distance from snout		72		70		70½		69
Length of base		18½		18		19		20
Origin of anal to origin of dorsal		38		38		36		39
Length of longest ray		9		9½		7½		8½
Length of last ray		6		5½		5		4½
Caudal:								
Length of middle rays		8		8		8		7
Length of external rays, superior interior								
.....		31		32		26		25+
.....						28		27+
Pectoral:								
Distance from snout		35		34		33½		32
Distance of tip from snout		55		54		53		52
Length		22		22		18½		20
Length of longest axillary ap- pendage		11		13				
Ventral:								
Distance from snout		53		52		54		51
Length		10		10		10		9½
Origin of ventral to end of dorsal		36		35		33		35
Dorsal rays		19		19		18		18
Anal rays		22		22		22		22
Number of scales in lateral line	47 to 50		47 to 50		abt. 65		abt. 65	

Table of Measurements—Continued.

Current number of specimen	894 c.		5,864 a.		5,864 b.		5864 c.	
Locality	Mouth of Rio Grande.							
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	73		86		81		74	
Body:								
Greatest height		40		38		36		38½
Head:								
Greatest length		30		32		30		33
Distance from snout to nape		22½		23		21½		24
Length of snout from perp. from centre of orbit		11½		12		10		11
Length of operculum		10		10		10		10
Long h of maxillary		14		14		13½		14½
Length of mandible		17½		17		16		17½
Distance from snout to centre of orbit		12						
Dorsal:								
Distance from snout		57		50		57		52
Length of base		17		16		18½		19
Origin of pectoral to origin of dorsal		37		36		33		36
End of dorsal to end of anal		27		31		26		25
Length of longest ray		14		14		12		14
Length of last ray		7		8		5½		7
Anal:								
Distance from snout		69		72		70		70½
Length of base		19		19		17		19
Origin of anal to origin of dorsal		37		37		36		37
Length of longest ray		7		impt. 7		6		9
Length of last ray		5		impt. 5		4		6
Caudal:								
Length of middle rays		9		7		6		9½
Length of external rays, superior		27		27				
inferior		27		30		25		
Pectoral:								
Distance from snout		30		33		30		32
Distance of tip from snout		47		48		47		50
Length		17		18		17		19
Ventral:								
Distance from snout		52		53		53		52
Length		10		9		8		10
Origin of ventral to end of dorsal		36		32		32		35
Dorsal rays	18		19		18		19	
Anal rays	21		22		20		21	
Number of scales in lateral line	65 or more.		abt. 70		abt. 55		abt. 55	

DESCRIPTION OF CAULOLATILUS MICROPS, A NEW SPECIES OF FISH FROM THE GULF COAST OF FLORIDA.

By G. BROWN GOODE and TARLETON H. BEAN.

The Smithsonian Institution has received from Mr. Silas Stearns, of the Pensacola Ice Company, Pensacola, Fla., a fish new to the fauna of the United States, and believed to be new to science. This fish was taken March 18, 1878, on the Snapper Bank, off Pensacola, in 35 fathoms of water. It was packed in ice, and arrived in good condition, March 22, at the National Museum, where it was cast in plaster, and sketched by Mr. Shindler. It is now a fine alcoholic specimen, No. 20,971 of the Fish Catalogue.

Caulolatilus microps is related to the Brazilian form *Caulolatilus chrysops* (Cuvier and Valenciennes) Gill, and the Cuban form *Caulolatilus cyanops* Poey, described in 1867.* Of the former, two specimens only

* Repertorio Físico-Natural de la Isla de Cuba, i, p. 312.

are recorded: one, the type of the original description, one foot long, collected on the coast of Brazil by M. Gay, and probably now in the Museum in Paris; a second in the British Museum, a stuffed specimen, purporting to have been collected in the West Indies. Of Poey's *C. cyanops* the National Museum possesses a fine specimen (Cat. No. 4750), 15 inches long, collected and presented by Professor Poey.

The Pensacola specimen, now under consideration, is two feet and three inches long, weighing nine pounds and one-quarter. Its color has faded, but a yellow blotch is still visible under the eye, similar to that mentioned in *C. chrysops*. A dark blotch is visible in and above the axilla of the pectoral.

The following diagnosis is believed to characterize the peculiarities of the new form. It is accompanied by a table showing the detailed measurements of *C. cyanops* and *C. microps*, and another showing the relations of *C. chrysops* as far as they can be gleaned from the published descriptions.

Caulolatilus microps, *sp. nov.*, Goode and Bean.

Diagnosis.—Height of body contained slightly more than three and one-half times in its length, its width seven times, the species being higher and more robust than *C. chrysops* and *C. cyanops*. Length of head equal to height of body, being in same proportion to total length as in *C. cyanops* (though less in proportion to height of body), and longer proportionally than in *C. chrysops*. Width of interorbital area equal to half the length of snout, instead of four-fifths, as in *C. cyanops*. Length of snout greater than that of maxillary. Diameter of eye contained six times in length of head, instead of four times, as in *C. chrysops*, and three and three-fourths times, as in *C. cyanops*. Nostrils midway from eye to snout, and separated by a distance equal to diameter of eye. Dentition much as in *C. cyanops*. Fins all shorter than in *C. cyanops*, the anal and soft dorsal two-thirds as high. Caudal fin slightly emarginate. Pectoral not extending to first ray of anal, as in the other species, less than one-fourth of total length. Scales in lateral line 120, in transverse line 48, being smaller and more numerous than in *C. cyanops*.

Radial Formula.—D. VII, 25; A. I, 23; C. 17; P. I, 16; V. I, 5, instead of D. VII, 24; A. I, 22; C. 19; P. I, 15; V. I, 5, as in *C. cyanops*, or D. VIII, 24; A. II, 22; C. 17; P. 17; V. I, 5, as in *C. chrysops*.

Table of Measurements.

Current number of specimen.....	<i>Caulolatilus microps</i> , 20,971.		<i>Caulolatilus cyanops</i> , 4,750.	
	Pensacola, Fla.		Cuba.	
Locality	Millim.	100ths.	Millim.	100ths.
	<i>Fresh specimen.</i>		<i>Alcoholic specimen.</i>	
Extreme length	620		330	
Length to end of middle caudal rays	690		365	
Body:				
Greatest height		28		24½
Greatest width		14½		12
Height at ventrals		28		24½
Least height of tail		8		7
Length of caudal peduncle		10		11
Head:				
Greatest length		28		28
Distance from snout to nape				15
Greatest width		14		13½
Width of interorbital area		7		8½
Length of snout		14		10
Length of maxillary		12½		10½
Length of mandible		13		12½
Distance from snout to centre of orbit		14½		11
Diameter of orbit		4½		7½
Dorsal (<i>spinous</i>):				
Distance fr m snout		34		32½
Length of base		12½		13
Greatest height		7½		8
Length of first spine		3½		5
Length of second spine		5½		6
Length of last spine		7½		9½
Dorsal (<i>soft</i>):				
Length of base		44½		46
Length of first ray		7		10½
Length of longest ray		8½	(22d)	13
Length of last ray		4½		5
Anal:				
Distance from snout		55		51½
Length of base		35½		37½
Length of antecodont spine		3		3
Length of first ray		6		7½
Length of longest ray		(9th) 8½	(11th)	12
Length of last ray		4½		5
Caudal:				
Length of middle rays		11½		11
Length of external rays		16		17½
Pectoral:				
Distance from snout		30½		27½
Length		23		26
Ventral:				
Distance from snout		34½		31
Length		14		16
Branchiostegals	VI		VI	
Dorsal	VII-25		VII-24	
Anal	I-23		I-22	
Caudal	17		19	
Pectoral	I-16		I-15	
Ventral	I-5		I-5	
Number of scales in lateral line	abt. 120		108	
Number of transverse rows above lateral line	13		10	
Number of transverse rows below lateral line	35		25	

Table showing Comparative Proportions of Atlantic Species of CAULOLATILUS.

	<i>C. chrysops</i> .*	<i>C. cyanops</i> .	<i>C. microps</i> .
Height of body in total length.....	4 $\frac{1}{2}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$
Width of body in total length.....	10	8 $\frac{1}{2}$	7
Head in total length.....	4 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$
Interorbital width in total length.....		12	14 $\frac{1}{2}$
Snout in total length.....		10	7 $\frac{1}{2}$
Upper jaw in total length.....		10	8
Snout to orbit in total length.....		9	7
Eye in head.....	4	3 $\frac{1}{2}$	6
Nostrils.....	Near eye.....	$\frac{3}{4}$ distance from snout to eye.	Midway from snout to eye.
Height of dorsal in total length (of body) ..		12 $\frac{1}{2}$	13 $\frac{1}{2}$
Anal.....			Farther from snout than in <i>cyanops</i> , and two-thirds as high.
Caudal.....			Less emarginate than in the other species.
Pectoral.....	Extends to first anal ray.	Extends to first anal ray.	Does not reach first anal ray.
Scales in lateral line.....	110+	108	120
Transverse rows of scales.....		35 (10 + 25)	48 (13 + 35)

* These proportionate measurements, as taken from the "Histoire Naturelle des Poissons", doubtless have reference to extreme length to end of external caudal rays. In this genus, however, the difference thus admitted is not extremely large.

APRIL 30, 1878.

THE OCCURRENCE OF HIPPOCAMPUS ANTIQUORUM, OR AN ALLIED FORM, ON SAINT GEORGE'S BANKS.

By G. BROWN GOODE.

A specimen of *Hippocampus*, measuring about five inches, was procured by the United States Fish Commission from a mackerel schooner, which had captured it, in company with a school of mackerel, on Saint George's Banks, in August, 1873. It was kept alive for some days, and an interesting fact was observed with regard to its habits, its tail apparently not being used for prehension. This specimen agrees very closely with *H. antiquorum* as described by Günther, and is provisionally referred to that species; it does not agree with the description and figure of *H. hudsonius*, DeKay, a species which has never been accurately defined, and which may prove identical with *H. guttulatus*, Cuv.

H. antiquorum is, then, an addition to the fauna of Eastern North America. The geographical range of the species is very wide; it has been recorded from the English coast, the Mediterranean at Malta and other points, Fernando Po, Japan, and Australia. Several specimens were collected in Bermuda in 1872 and 1877 in company with *H. guttulatus*.

A specimen received by Storer from Holmes's Hole was, in his first report, referred to *H. brevirostris*, Cuv., which is synonymous, according to Günther, with *H. antiquorum*. Storer afterward adopted the name proposed by DeKay, but his description and figure refer to a form more nearly resembling that now under consideration.

The following notes were taken from the fresh specimen, the colors while it was living:—

No. 21044, U. S. Nat. Mus. Cat. Fish.

Body rings, 1 + 10. Caudal rings, 37. Tubercles of body and tail elongated, slightly recurved, usually prolonged into slender filaments; those on the 2d, 4th, and 6th body rings much larger than the others; tubercles prominent and filamentose upon the 4th, 6th, 9th, 12th, 16th, and 20th caudal rings. Ventral tubercles upon 6th, 7th, 8th, and 9th body rings. Occipital crest very high, with five prominent tubercles, the anterior two with long filaments. Length of snout equal to distance from posterior margin of orbit to gill-opening. Operculum marked with fine, radiating striæ.

Radial formula.—D. 19 (the first imperfect). P. 18. V. 4.

Color.—Yellowish-brown; the eyes and cheeks covered with radiating, wavy lines of light brown. Snout encircled by a narrow, undulating, white band near its middle.

The Commission has an accurate sketch by Mr. Emerton.

APRIL 30, 1878.

**DESCRIPTIONS OF NEW SPECIES OF SHELLS FROM CALIFORNIA
IN THE COLLECTIONS OF THE NATIONAL MUSEUM.**

By W. H. DALL.

Haliotis (? var.) *assimilis*, n. s.

Shell solid, strong, not very thick, with a rather light pink, white and greenish nacre, usually with five open holes; spire more elevated than that of any other Californian species, consisting of two and a half or three whorls; aperture very oblique in adult specimens, the thickened margin of the columella narrow, somewhat concave, inclined sharply inward and upward, about three-fourths as long as the columellar side, of the aperture. Between the row of openings and the columellar edge, the space is unusually broad, marked midway by an obtuse carina, separated from the row of holes by a shallow channel; surface reddish or dull greenish, with rather rough, crowded, unequal, spiral ribs and rounded, irregular, wavy, radiating undulations crossing the spiral sculpture obliquely. The muscular impression, in most specimens, is but lightly marked, and, except for occasional spot-like impressions, is smoothly nacreous, like the rest of the interior. Lon. 4.5 in. Lat. 3.0 in. Alt. of spire 1.5 to 2.0 in. Aperture 3 inches wide and 3.75 long, in an adult specimen.

Habitat.—Monterey; San Diego, Cal.; in deep water only; thrown up by heavy storms, usually dead and worn when found and everywhere rare. Mus. Cat. 31267.

This species, or variety, has long been known to me and to most Californian collections, but has not hitherto been characterized, owing to the dead condition of most of the specimens found. Mr. Hemphill having forwarded two fresh specimens, it seems well to put it on record.

The form is different from any other Californian species; the spiral

sculpture is that of *H. rufescens*; the radiating sculpture, except that it is not sharp or imbricated, recalls *H. corrugatus*, and the naere is similar but less bright. These characters suggest the possibility of its being a hybrid between *H. corrugatus* and *rufescens*; but if this be the case, why should it not have a similar habitat? Those two species are littoral, but this is exclusively deep-water. I have received it from Dr. Canfield, Mrs. Capt. Lambert, and others, in past years, and have examined some twenty specimens of all ages.

Acmæa (scabra var.?) *Mörchii*, n. s.

Shell conical, much elevated, with a sub-central recurved apex resembling that of *Helcion pectinatus* covered with close-set, rough, imbricated ribs and riblets, the coarse, imbricated, sharp lines of growth forming with the other sculpture a close reticulation in some specimens. Interior with a brown-mottled spectrum and margin, otherwise white; exterior dull grayish or greenish speckled. The imbrications on the principal ribs very strong, in some specimens forming small spines concave beneath. Lat. 16^{mm}. Lon. 20^{mm}. Alt. 10^{mm}.

Tomales Bay, California, Hemphill, 16 specimens. Mus. Cat. 31268.

This very peculiar form has the sculpture of *A. scabra*, but much exaggerated, and very nearly the profile of *Helcion pectinatus*. The recurved apex recalls that of *A. persona*. It would not be referred to any described Californian species if its characters, as they appear, were the only test. But it is almost certain that all the species of Limpets and *Siphonariæ*, which have this peculiar elevated shape, acquire it from a particular habitat which they seem to prefer. This may be the stem of a large *Fucus*, a shell, round pebble, or what not, as in the case of those species of *Acmæa* usually (but wrongly) termed *Nacella* by Californian conchologists: *Acmæa asmi*; *Liriola subspiralis*; etc. They all have a flattened or normal variety, though this is often very rare.

Hence I consider the elevated form and pointed apex as probably due to a peculiar habitat, as in the other cases; a view which is borne out by a peculiar arcuation of the margin in most of the specimens, as if the creature had lived on a round shell or pebble.

Eliminating the elevation as a permanent character, the shell, apparently very limited in its distribution, might well be a hybrid between *A. scabra* and *A. persona*. Whether this be the case or not, it is a very remarkable form, and well deserves a name, even if only of varietal value. We owe its discovery to Mr. Hemphill's industry and eminent abilities as a collector.

APRIL 30, 1878.

**CATALOGUE OF THE BIRDS OF DOMINICA FROM COLLECTIONS
MADE FOR THE SMITHSONIAN INSTITUTION BY FREDERICK A.
OBER, TOGETHER WITH HIS NOTES AND OBSERVATIONS.**

By GEORGE N. LAWRENCE.

In the *Annals of the New York Academy of Sciences*, vol. 1, p. 46, I called attention to the explorations in the Lesser Antilles that were being made by Mr. F. A. Ober, giving an account of his progress up to that time in the island of Dominica, and stating that when his final collection from there was received, a catalogue of the birds obtained and noticed by him would be published.

When his last collection came to hand, it was found that the publication of the promised catalogue would be delayed; it was therefore deemed best to give a provisional list of the species in *Forest and Stream*; this appeared in the issue of December 6, 1877.

On his second visit to Dominica, Mr. Ober had an attack of fever, which debarred him from concluding his explorations satisfactorily. Several species that were seen by him, but not procured, he was able to identify. A few other birds were heard of, but the descriptions given of them were insufficient for their identification; these being undoubted inhabitants of the island are included in the catalogue, with such information as he could obtain concerning them. Some of these species Mr. Ober hopes to have procured for him by residents, who promised to make efforts to do so.

Mr. Ober is entitled to much credit for his industry and perseverance thus far, and his notes testify that his heart is in the enterprise.

Besides birds, he has sent valuable collections in other branches of science.

I have received from him, by way of introduction to this catalogue, the following interesting account of the physical features of Dominica, with incidents of his movements, localities where birds were procured, etc.

All of his communications and notes are designated by quotation-marks.

The arrangement of this catalogue is the same as that of the *Nomenclator Avium Neotropicalium*, by Messrs. Selater and Salvin.

"The island of Dominica is 25 miles in length by 16 in breadth. It is mountainous in character, consisting of a central ridge running north and south, from which chain project hills and spurs east and west; thus the entire island is but a succession of hills and valleys, the latter ever narrowing into ravines and gorges, from which pour foaming streams and torrents.

"The coast-line is for the greater part bold and precipitous, some of the hills slope gently to the sea, and some of the valleys open upon spacious bays, which, though not deep, afford good anchorage on the Caribbean side for small craft. From the volcanic nature of this island,

being thrust up from the great ocean bed, the water all around it is of great depth, and vessels anchoring off Roseau, the principal town, often run out sixty fathoms of chain before bringing up.

"Thus when I speak of the small depth of the bays, I mean the small indentations they make in the general line of the shore. The valleys and low hills of the Caribbean shore are tolerably well cultivated, principally in sugar-cane; the provision ground of the negroes reaching often to high hill-tops.

"On the east or Atlantic side, called the 'windward' side of the island (from the fact that the prevailing wind here is the northeast trade), are a few fine, though isolated, sugar estates, situated where deep bays give opportunity for boats to land. The nature of the east side of the island is more rocky, and the seas more boisterous than the west or Caribbean slope. The almost unceasing trade-wind keeps the Atlantic in a tumult, in striking contrast to the calms of the Caribbean waters.

"As this island is about midway the group known as the Lesser Antilles, being in lat. $15^{\circ} 20'$ — $15^{\circ} 45'$; long. $61^{\circ} 13'$ — $61^{\circ} 30'$, it possesses much in its fauna that will prove of interest; and doubtless some species will be found to inhabit it that exist neither north nor south of it; some that are found north but not south, and *vice versa*. Possessing as it does the highest mountain peak in any island south of Jamaica, and a range of mountains and hills of 2,000 to 3,000 feet in height, the essential character of the fauna is mountainous. In fact, along the coast and in the low valleys, very few birds are obtained more than the ordinary sparrows, hummingbirds, etc. Though not rich in either numbers or species, Dominica contains its best birds in high mountain valleys. Each kind has its characteristic haunt and breeding place, as will be described hereafter, and the majority of them are in the mountains and mountain valleys.

"My first collecting ground was at Landat (see Forest and Stream), a mountain vale 1,500 feet above the Caribbean Sea, at the head of the Roseau Valley, which latter made up into the mountains from the sea for nearly five miles. The average temperature of this region was ten degrees lower than at Roseau, 1,500 feet below; at night a blanket (sometimes two) was necessary. I collected here for a month—the month of March—during which period I visited the famous Boiling Lake, a chain of lakes on the mountains, the near mountain peaks, and thoroughly explored every accessible ravine and valley within a day's walk.

"After shipping my collections to the Smithsonian, I started for the central 'windward' portion of the island, where reside the last vestiges of the Carib Indians. With them I resided six weeks, in a cabin close by the Atlantic shore. It was while there that I procured the Imperial Parrot, and other birds of less note, by making forced marches into the high mountains.

"I should note here that everything I needed had to be transported

over the rugged mountain trails, from the town of Roseau, a journey of a day and night, upon the heads of men and women.

"In May I returned to Roseau. In June I passed a week in Landat, finding little difference in the birds, except in the scarcity of the Hummingbirds and a few others. I also spent more than a week, in June, at Batalie, a lime plantation midway the west coast, where I found a few birds which I had seen in the mountains more abundant, and one species—the Tropic Bird—breeding in the cliffs.

"During May and June I was exhausted by a low type of fever, the result of exposure, which greatly retarded my efforts to secure greater numbers of birds. From subsequent observation, however, and enquiry, I am certain that nearly all the resident species have been obtained. The very few not procured will be noticed further on.

"On the 15th September I returned to Dominica, after a visit to some of the northern islands. Making my way at once to the mountains, I had opportunity to note the changes that the seasons would make in the time which had elapsed since my first visit. The Hummingbirds were in great abundance, the 'Mountain Whistler' nearly silent, and *perdu*; the Flycatchers same as usual; Wrens about the same, but more in the deep woods; sparrows, finches, etc., in customary abundance; the 'game birds'—'Perdix', 'Ramier', and 'Tourterelles'—in abundance.

"During this visit I succeeded in procuring the only species of Owl known in Dominica. The first was a female, September 18, sitting upon its nest, which contained three eggs freshly laid. The following day brought in the male; this was the only find of value.

"Strange to say, my old enemy, fever, visited me again, the first night I spent in the mountains; though I had been exempt from it for two months, and my last visit there had aided in its cure. This discouraging welcome to Dominica (I do not, though, attribute it solely to the climate) prevented me from going out on a projected trip to the mountains beyond for the Parrot; I sent my men but they failed to get the bird.

"The migratory species had arrived in small numbers—Golden Plover, Sandpiper, etc.—and the water of Roseau Bay was black in places with large flocks of the 'twa-oo', a species of tern. These birds only come before a gale and are harbingers of a storm. September being a hurricane month, very few sailing craft of any kind were about; being, especially in the French islands, hauled up, to remain so through October.

"Much to my regret, I was unable to procure the Parrot, but little larger than our Carolina Parrot, and the 'Diablotin'. The latter was, twenty years ago, in great abundance, breeding in the mountains; but of late years it has become so scarce as to appear almost mythical. Its disappearance is attributed to the depredations of the 'Manacon', a worthless marsupial animal, introduced into Dominica years ago. Although the Diablotin is, probably, identical with the Petrel found in the Blue Mountains of Jamaica (the *Prion Cariŭbaea*, as suggested by

Prof. Baird); yet it would be very interesting to know exactly what it is. If it is possibly remaining, I have hopes of securing it, as my friend H. A. Alford Nicholls, M. D., of Roseau, has offered a large reward for it; if obtained, to be sent to the Smithsonian.

"Having been in the island during the breeding season, I procured many nests and eggs, which are, probably, little known. Nests and eggs of three species of Hummingbirds, the 'Perdix', Owl, and many smaller birds, were received.

"There are few sea birds resident here, or even visitors for the purpose of incubation, owing to the precipitous character of the coast, and the absence of small islands or detached rocky islets.

"From Dominica I sailed south to St. Vincent, where I remain at this present writing (October).

"Trusting you will make allowance for the many imperfections in this (necessarily) hasty sketch; and hoping to give you full and perfect descriptions when I have leisure to elaborate my notes,

"I remain, faithfully yours,

"FREDERICK A. OBER.

"It would be wrong in me to conclude without acknowledging the obligations I am under to a few gentlemen of Dominica.

"To the President of the island, C. M. Eldridge, Esq., for kindly letters of introduction to other islands; for much proffered aid and a great deal of information.

"To Dr. Imray, the oldest medical man in the island, one who has done much to develop the natural resources of Dominica; a botanist of repute, especially an authority on Tropical plants, to him I am indebted for many favors. Free access to a large and well-selected library was one of the many delights his generous nature afforded me.

"To the Hon. William Stedman, for many and delicate acts of kindness.

"To Dr. H. A. Alford Nicholls, for numerous favors. I never can repay the debt I owe these two gentlemen, for the many and continued attentions during my stay. At the time when I was sick with fever, it was to the attentions of the one and the skilful medical attendance of the other, that my rapid recovery was due. The period of convalescence, passed principally in their society, will continue a very pleasant remembrance.

"The information possessed by Dr. Nicholls upon wood and mountain life was freely placed at my disposal, and it was owing chiefly to his suggestions, that my collecting grounds were so judiciously chosen as to comprise within their areas the characteristic birds of the island. Upon botany and ethnology the doctor is well informed, and his collections and herbarium promise to become very valuable.

"These remarks will perhaps account for my protracted stay in the island, and for a lingering regret at leaving it."

Fam. TURDIDÆ.

1. *Margarops herminieri* (Lafr.).—Local name, "Morer".

"This curious bird inhabits the high woods; especially does it delight in the comparatively open places beneath the towering *gomier* trees, where perhaps a narrow trail has left the ground bare of leaves. There you will find where it has been scratching with its strong feet. It is very shy, and being very good as food it is sought by the mountaineers, who call it to them by imitating its cry of distress.

"Iris tea-color. Not abundant.

"Length, ♂, 9 in.; alar extent, 15; wing, 5; tail, $3\frac{1}{2}$."

Of this fine species there are five males in the collection, but no females, and Mr. Ober makes no allusion to their plumage. It has not before been recorded from Dominica.

2. *Margarops densirostris* (Vieill.).—Local name, "Gros Grive".

"These birds are much esteemed for their flesh, and are hunted without mercy, when the law allows. They are thus made very shy; at St. Marie, however, in the Indian section of Dominica, where they are not shot, they are very tame, and frequent the mango and breadfruit trees about the habitations of the people. They lay in April and May.

"Iris very pale straw color; bill horn color.

"Length, ♂, 11 in.; alar extent, $17\frac{1}{2}$; wing, $5\frac{1}{2}$; tail, $5\frac{3}{4}$."

The sexes do not differ apparently in size or plumage; not before noted from Dominica.

3. *Margarops montanus* (Vieill.).—Local name, "Grive".

"Abundant, but much reduced in numbers by being shot for food. In habits and actions much resembles the American Mockingbird, without his song, however.

"Iris yellow.

"Length, ♂, $9\frac{1}{2}$; alar extent, $14\frac{3}{4}$; wing, $4\frac{3}{4}$; tail, 4."

Numerous specimens of both sexes sent; no apparent difference between them; also not sent before from this island.

The nest of this species is composed of fine roots loosely woven together; the inside with the smallest roots, but no soft lining; it is very shallow, and appears small for the size of the bird, having a diameter of but four and a half inches; there are two eggs of a uniform beautiful aqua-marine blue, measuring $1.20 \times .75$.

Collected at Shawford Valley, May 10.

4. *Cinclocerthia ruficauda*, Gould.—Local name, "Trembleur".

"Its name is given from its habit of quivering its wings. Abundant in the mountains and lower valleys. (See letter in Forest and Stream.)

"Length, ♂, 9 in.; alar extent, $12\frac{1}{2}$; wing, 4; tail, $3\frac{1}{2}$."

The sexes are alike in colors and dimensions. This species has not been obtained before in Dominica.

5. "Thrush"?

"Another bird was described by several persons, something like the Thrush, but with yellow bill and legs. Its egg is like the Cuckoo's in shape and color."

Of course, it can only be determined by examples.

Fam. SYLVIIDÆ.

6. *Myiadestes genibarbis*, Sw.—Native name, "Siffleur Montagne; Solitaire".

"The Mountain Whistler frequents the most gloomy and solitary mountain gorges, seeking the most retired situations—not so much from shyness as from some inherent proclivity.

"Found on the borders of open glades in the morning when seeking its favorite food, the berries of a tall shrub. Never found below 1,000 feet altitude. Its mellow notes are first heard from a dark ravine above Shawford Valley as one ascends the mountains. (See Forest and Stream.)

"Length, ♂, $7\frac{1}{2}$ in.; alar extent, 11; wing, $3\frac{3}{4}$; tail, $3\frac{1}{2}$."

The female differs from the male only in having a wash of brownish-olive across the middle of the back. There is a single specimen of the young; in this each feather of the upper plumage terminates with black, and has an adjoining subterminal round spot of bright rufous; the feathers of the under plumage are more rufous, with the terminal edge less distinctly marked with black; the throat and under tail-coverts are light rufous; the tail as in the adult. This specimen is spotted much in the same manner as the figure of the young of *M. ralloides*, in *Exotie Ornithology*, by Messrs. Selater and Salvin, pl. xxxii.

The *M. armillatus* of Bonaparte (Cons. Av. i, p. 335) agrees best with *M. genibarbis*, Sw., as he describes the parotic region to be black, striped with white, a character peculiar to that species. He has Swainson's name as a synonym, considering the two to be identical; he gives for the habitat Central America and the Antilles.

Prof. Baird (Rev. Am. Birds, p. 421) proves that *M. armillatus*, Gosse, from Jamaica, is not *M. armillatus*, Vieill., and names it *M. solitarius*. The true habitat of Vieillot's species is thus left unsettled, and I believe no authentic examples of it are known to exist in any collection. Vieillot, in his original description (Ois. Am. Sept. i, p. 69, pl. 42), gives the Antilles as its habitat; afterwards (Enc. Méth. ii, p. 824) specifies Martinique as a locality.

Mr. Selater (P. Z. S. 1871, p. 270) considers the last reference as probably applying to *M. genibarbis*. Mr. Selater also says:—"It is possible that *M. armillatus verus* may be the species from St. Domingo, where there is an unknown representative of this form."

M. genibarbis is noted from St. Lucia by Mr. Selater in his list of the birds of that island (P. Z. S. 1871, p. 263). The specimens from there he compared with two examples of *M. genibarbis* in the Swainson collection at Cambridge, and found them to agree.

Swainson erroneously supposed this bird to be a native of Africa; his figure of it (Nat. Lib. vol. xiii), to be correct, should have the chin and an elongated quadrate mark on the lower eyelid pure white.

There are in the collection twelve adult specimens, which are apparently in full plumage, having the pure white chin and rictal stripe separated by a black line, and the white patch on the lower eyelid; in the young example, the white marks are wanting.

Fam. TROGLODYTIDÆ.

7. *Thryothorus rufescens*, Lawr., *Ann. N. Y. Acad. Sci.* v. 1, p. 47.

"Wren, ♂, Landat, March 3, 1877.

"Found only in the deep, dark woods, or on their borders. I shot several, but lost them in the rank vegetation. They have a most delicious song, like, I think, our Northern Wood Wren. Will have more extended notes at some future day. I just missed getting its egg. In June I found a nest, and had my boys watching it for eggs, but some one robbed it before me. When I left, I told the people of the valley to procure the eggs and save them for me.

"It (the nest) was merely a few straws in a small hole in a bank, about six inches deep, with a diameter of four inches.

"Length, $4\frac{1}{2}$ in.; alar extent, $6\frac{5}{8}$; wing, $2\frac{1}{4}$; tail, $1\frac{3}{4}$.

"Iris bright hazel. Abundant in the deep woods, but hard to find from its terrestrial habits. Native name, 'Osenoli'."

In the first two collections, there being but the type-specimen, I requested Mr. Ober to get more; in the last collection are four others, but all are males. These were procured in September, and are of a darker or brownish-rufous, no doubt owing to the different season.

Fam. SYLVICOLIDÆ.

8. *Siurus nævius* (Bodd.).

"Wagtail—very scarce.

"Shot while feeding about the pools of the upper waters of the Roseau River, a rocky stream of cascades and water-falls.

"Length, $5\frac{3}{4}$ in.; alar extent, $9\frac{1}{4}$; wing, $3\frac{1}{8}$, ♀."

9. *Dendrocæa virens* (Gm.).

"Only one seen; very ragged in plumage.

"Length, 5 in.; alar extent, $7\frac{5}{8}$; wing, $2\frac{3}{4}$, ♂."

10. *Dendrocæa petechia* (Linn.).

"Yellow Warbler, 'Titien'. Shawford Valley, March 21.

"Abundant on the plantations of the east coast, overgrown with guava-bushes.

"Length, 5 in.; alar extent, $7\frac{1}{4}$; wing, $2\frac{3}{8}$, ♀."

"A nest with eggs was taken at St. Marie in April."

The nest is well shaped and compactly formed; is composed of fine dried grasses, the outside of coarser materials, strips of bark, and long,

thin, flag-like leaves, intermixed with a little cotton. It seems large for the bird; it measures in outside diameter 5 inches; height, $2\frac{1}{4}$; depth of cavity, $1\frac{1}{2}$ inches. There are three eggs of a dull white, sparingly speckled with reddish-brown, except on the larger end, where the spots are confluent; two measure in length .75 of an inch and .50 in breadth; the other is .55 in breadth.

11. *Dendroeca plumbea*, Lawr., Ann. N. Y. Acad. Sci. v. 1, p. 47.

There are no notes which apply to this species.

12. *Setophaga ruticilla* (Linn.).

"Redstart, 'Chat'. Not common.

"Length, 5 in.; alar extent, $7\frac{1}{2}$; wing, $2\frac{1}{2}$, ♂."

Fam. VIREONIDÆ.

13. *Vireosylvia calidris* var. *dominicana*, Lawr.

"I think this bird is a summer visitor only, as I did not see it before March 19, and then only one. It increased in numbers in April and May; was abundant in the Indian Settlement. I send nest and eggs. Its note makes it conspicuous.

"Length, ♂, $6\frac{1}{2}$ in.; alar extent, $10\frac{1}{4}$; wing, $3\frac{1}{2}$; tail, $2\frac{5}{8}$."

"Local name, 'Chewick'. Iris hazel."

Male.—Upper plumage olive-green, purer and brighter than in *V. calidris*; cap of a clear ash, rather darker than that of var. *barbatula*; a distinct blackish line along the edge of the crown; superciliary stripe ashy-white; cheeks with a tinge of buff; lores and a stripe behind the eye dusky; a blackish moustachial line along each side of the throat; the under plumage is grayish-white, purer on the upper part of the throat and abdomen; sides pale olive-green; under wing-coverts yellow; crissum pure pale yellow; the bill is large and darker than in its allies; the upper mandible is blackish horn-color, the under whitish horn-color.

The female differs in no respects from the male.

The only necessary direct comparison with any of the West Indian or moustached form is with var. *barbadense*, Ridg.; that and the present bird only having a distinct dark line along the edge of the crown. The type of *barbadense* was kindly sent me by Mr. Ridgway: it is smaller than the Dominica species; the plumage above is of a lighter brownish-olive, the cap not so dark, the under parts of a pale yellowish or creamy-white, and the bill of a fleshy-brown color; in general coloring they are quite unlike.

The nest (marked "St. Marie, April 22, '77") is not the beautiful structure described by Dr. Brewer (N. Am. Birds, v. 1, p. 362) belonging to *V. calidris* of Jamaica, and does not appear to have been pensile; it is composed of fine grasses, intermixed on the outside with a coarser kind of a long, thin, ribbon-like form. There are but two eggs—perhaps not the full complement; they are of a dull white, rather closely spotted with

pale chocolate, confluent at the larger end; they measure in length .80 of an inch by .60 in breadth.

The nest measures in outside diameter $3\frac{1}{2}$ inches: depth of cavity $1\frac{1}{2}$ inches.

Fam. HIRUNDINIDÆ.

14. *Progne dominicensis* (Gm.).

“‘Hirondelle.’ Resident.

“The first seen was shot at Mountain Lake, 2,300 feet above sea-level, March 23; later in the season I found a few on the Atlantic side, in June, breeding in the cliffs at Batalie, on the Caribbean shore.

“Length, $7\frac{3}{8}$ in.; alar extent, 15; wing, $5\frac{3}{4}$, ♂.”

Fam. CÆREBIDÆ.

15. *Certhiola dominicana*, Taylor.—Local name, “Sucrier”. St. Marie.

“I procured a series of these, that you might be able to determine better the local differences.

“Everywhere abundant in lowland and mountain valleys; breeds in old plantations from March through to the rainy season. I send nests and eggs.

“Length, $4\frac{5}{8}$ in.; alar extent, $7\frac{3}{4}$; wing, $2\frac{1}{2}$.

“I put in a few nests of these birds to illustrate the domed structure—a character that prevails among the smaller birds—grass-birds, Sparrow and Sucrier.”

There are two nests, globular in form, one containing three eggs, obtained at St. Marie, April 20, 1877; the other with four eggs, in Shawford Valley, in April. For the size of the bird, the nest seems a bulky structure, but is elaborately made; the inside is of fine grasses; the outside of fine wiry stems of some plant, and the thin flag like leaves spoken of in describing the nest of *Dendroica petechia*; it has an outside diameter of 5 inches, the depth of the cavity 3 inches, across the opening $1\frac{3}{4}$ inches. The entrance is on the side. The eggs are dull white, some closely spotted with pale reddish-brown; others less so; some with the spots confluent at the larger end; others having them distinct. They measure .68 of an inch in length by .53 in breadth.

Fam. TANAGRIDÆ.

16. *Euphonia flavifrons* (Sparm.).

“‘L'oiseau de St. Pierre.’ Rare.

“Feeds among the tops of trees in the high woods; said to occur, also, on the coast; stomach full of small green seeds.

“Length, $4\frac{3}{4}$ in.; alar extent, 8; wing, $2\frac{5}{8}$; tail, $1\frac{5}{8}$, ♀.”

There is in the collection but one specimen, a female, which I suppose to be this species. I wrote Mr. Ober to endeavor to get others, but he was unable to do so. I have a male specimen from Porto Rico of *E.*

selateri, presented by Dr. Gundlach—this is much smaller than the above, measuring in length $4\frac{1}{4}$ in.; wing, $2\frac{5}{16}$; tail, $1\frac{7}{16}$.

17. *Saltator guadeloupensis*, Lafr.—Local name, "Grosbee".

"Found among the bushes and low trees fringing the cleared valleys and open plateaus. Its clear note makes it a marked bird in the breeding season. Found eggs in May. Inhabitant of both coasts. Not abundant.

"Length, $8\frac{1}{2}$ in.; alar extent, $12\frac{1}{4}$; wing, 4; tail, $3\frac{5}{8}$, ♀.

"Length, $8\frac{1}{2}$ in.; alar extent, $12\frac{1}{2}$; wing, 4; tail, $3\frac{5}{8}$, ♂.

"Nest obtained at St. Marie, Indian country, May 1, 1877; lays from two to three eggs at a time."

The sexes do not differ in plumage. The nest is made of the stems of coarse grasses, and though appearing to be loosely put together, yet is quite compact; there are a few finer stems at the bottom of the cavity. The outer diameter is $5\frac{1}{2}$ inches, height 3 inches, depth of cavity $1\frac{3}{4}$ inches. The eggs are light greenish-blue, with a few irregular black markings on the larger end; the length is 1.06 of an inch, the width .80.

Fam. FRINGILLIDÆ.

18. *Loxigilla noctis* (Linn.).—Local name, Moisson; Père Noir; Sparrow.

"The male is black, the female gray, I have no doubt, as they are always seen together. Very common, especially on old plantations; make their nests in low trees and stout shrubs. The nest sent, with three eggs, was obtained in Shawford Valley, March 21, 1877.

"Length, $5\frac{1}{2}$ in.; alar extent, 9; wing, 3; tail, $2\frac{3}{8}$, ♂.

"Length, $5\frac{1}{4}$ in.; alar extent, $8\frac{1}{2}$; wing, $2\frac{7}{8}$; tail, $2\frac{5}{8}$, ♀."

The nest under examination is placed in the upright trifurcated branch of a prickly shrub or tree, and is thus supported behind and on each side; it is a large and loosely formed structure, composed of fine stems of plants, dried leaves, and small, dried plants; it is covered over or domed, and has a large opening in front, the lower part, which is the nest proper, is more compact, and is lined at the bottom with fine, soft grasses or stems of plants; the height of the nest outside is 8 inches, the breadth 5; the opening in front has a diameter of 3 inches; depth of cavity, 2 inches. The complement of eggs is three. Those sent differ much in size and appearance. One is nearly white, marked with minute pale spots of reddish-brown, quite evenly distributed; this measures .80 by .62 of an inch. Another, of about the same size, is more conspicuously spotted; at the larger end densely so; size, .78 by .57. The last is much smaller, the spots larger and darker; it is closely spotted all over, the spots not confluent at the larger end; it measures .72 by .50.

Mr. Selater speaks of the single specimen from St. Lucia (P. Z. S. 1871, p. 271), and referred to this species as differing from a Martinique

skin in having "no rufous at all on the crissum, and the superciliary mark shorter".

Five males in the collection from Dominica have the under tail-coverts rufous, of the same shade as that of the throat; the rufous line running from the bill is darker, and extends over the eye as far as upon a line with its centre. Probably the Dominica and Martinique birds are alike; but if other examples from St. Lucia prove to be without rufous crissums, it would seem to be a well marked variety.

The female from Dominica is, above, a brownish-olive, having the face, sides of the head, and upper tail-coverts tinged with rufous; the wing-coverts and tertials are edged with bright rufous; the under plumage is of a dark ashy-olive; the under tail-coverts are pale rufous.

Specimens of a *Loxigilla* collected in Guiana by Mr. A. H. Alexander (taxidermist), though similar in color and markings to examples of *L. noctis* from Dominica, are so much less in all their measurements that I think, at least, it may be considered a variety. The bill of the Guiana bird is much smaller, the under mandible of a brownish horn-color, being black in the West Indian bird; the under tail-coverts are of a paler rufous; the rufous of the throat more restricted, and the superciliary line extending beyond the eye.

The measurements of the two are as follows:—

Dominica bird, ♂, length, $5\frac{1}{2}$ in.; wing, 3; tail, $2\frac{3}{4}$; tarsus, $\frac{3}{4}$.

Guiana bird, ♂, length, $4\frac{1}{2}$ in.; wing, $2\frac{5}{8}$; tail, 2; tarsus, $\frac{5}{8}$.

Viewed together, the skin of the West Indian bird appears to be nearly twice the bulk of the other.

I propose to distinguish the South American form by the name of *Loxigilla noctis* var. *propinqua*.

Mr. Alexander obtained quite a number of this small species in Guiana, but he had disposed of most of them before they came under my notice. Three males examined were alike in size and coloring. I was unable to find a female among the birds collected by him: this is easily accounted for; his object in making collections being to secure the more showy and saleable males.

Mr. Alexander informed me that they were not uncommon along the Essequibo River, and that he saw them also at Berbice.

The only citation of Guiana as a locality for *L. noctis* that I have noticed is by Bonaparte (Cons. Av. i, p. 493), viz, "Surinam"; he also gives Martinique.

19. *Phonipara bicolor* (Linn.).

"Si St Yerbe; Grass-bird.

"Abundant everywhere; breeds in great numbers in Shawford Valley, three miles from the coast; nests in lime-trees.

"One with three eggs taken April, 1877; another with four eggs."

"Length, ♂, $4\frac{3}{8}$ in.; alar extent, $6\frac{7}{8}$; wing, $2\frac{1}{4}$.

"Length, ♀, $4\frac{1}{4}$ in.; alar extent, $6\frac{1}{2}$; wing, $2\frac{3}{8}$."

The nest is globular in shape, and is composed of fine roots and stems of plants, intermixed with thin, flag-like leaves; it is $6\frac{1}{2}$ inches high and $5\frac{1}{2}$ inches broad; the opening is 2 inches across; depth of the cavity, $1\frac{1}{2}$ inches. The eggs are quite uniform in appearance; they are white, with a scarcely perceptible greenish tinge, sparingly speckled with reddish-brown, except on the larger end, where the examples vary in having the spots more or less confluent. They vary in size from .66 to .57 of an inch in length, and in breadth from .54 to .50.

Fam. TYRANNIDÆ.

20. *Elainea martinica* (Linn.).—Local name, "Quick".

"Rather abundant in the mountain valleys, especially in the lateral ravines bordering the glades of open pastures. In habits and cry resembling our Phœbe-bird.

"Length, ♂, $6\frac{3}{4}$ in.; alar extent, $10\frac{1}{2}$; wing, $3\frac{1}{2}$.

"Length, ♀, 6 in.; alar extent, 10; wing, $3\frac{3}{8}$."

Of this species, Mr. Ober sent nine examples. Mr. Selater (P. Z. S. 1871, p. 271) considers *E. riisii* from St. Thomas "undistinguishable" from *E. martinica*. I have but one specimen of *E. riisii*, which differs only from the Dominica bird in being light brownish-olive above; the upper plumage of *E. martinica* is dark olive; the difference may be seasonal. Mr. Selater also raises the question whether *E. pagana* "is really separable"; in five specimens, so-called, from Brazil, Guiana, and New Granada, the most marked difference from the West Indian bird is that the breast and abdomen are of a decided pale yellow. In *E. martinica*, the throat and breast are of a clear bluish-gray, the abdomen with just a tinge of yellow.

Mr. Selater (P. Z. S. 1870, p. 834) thinks that his *E. subpagana* will have to be reunited to *E. pagana*. I have one example of this form, from the City of Mexico, which is of a bright yellowish-olive above, and the abdomen of a fine clear light yellow. These differences may be due to geographical position.

21. *Myiarchus oberi*, Lawr., Ann. N. Y. Acad. of Sci. v. 1, p. 48.—Local name, "Soleil coucher".

"It is so called because it utters its peculiar cry just at sunset; the hunters say when Soleil Coucher cries, it is time to make *ajoussa*, or camp. Obtained at Landat in March; not common.

"Length, ♂, 9 in.; alar extent, $12\frac{1}{2}$; wing, 4.

"Length, ♀, $8\frac{1}{4}$ in.; alar extent, $12\frac{1}{2}$; wing, 4."

22. *Blacicus brunneicapillus*, Lawr., Ann. N. Y. Acad. Sci. v. 1, p. 161.—Local name, "Goubemouche".

"Everywhere abundant in the ravines and dark valleys of the mountains.

"Length, ♂, $5\frac{3}{4}$ in.; alar extent, $8\frac{1}{2}$; wing, $2\frac{7}{8}$; tail, $2\frac{3}{4}$."

23. *Tyrannus rostratus*, Sel.

"Pipere; Loggerhead."

"More an inhabitant of the lowlands than the mountains; found it abundant in St. Marie, Atlantic coast.

"Found a nest with two eggs, April 20, 1877.

"Length, ♂, $9\frac{1}{2}$ in.; alar extent, 15; wing, $4\frac{1}{2}$.

"Length, ♀, $9\frac{3}{4}$ in.; alar extent, $15\frac{1}{2}$; wing, $4\frac{3}{4}$."

The nest is rather loosely made, of small harsh-feeling roots and stems of plants, with no soft lining for the eggs; it is $4\frac{1}{2}$ inches wide, with a height of 2 inches, the cavity but half an inch deep. The two eggs are alike in size, but vary in shade of color: one is of a light reddish salmon color, with large conspicuous spots of a deep rusty-red, mostly around the larger end; the other is white, with a slight tinge of color, the spots smaller and less conspicuous. They measure 1.06 by .77.

Fam. TROCHILIDÆ.

24. *Eulampis jugularis* (Linn.).

"Large Crimson-throat Hummingbird."

"This species called 'Colibri' in *patois* French.

"This species is almost exclusively a frequenter of the high valleys of the mountains, though found lower down also. It delights in the plantain and provision grounds of the mountain sides, and there may be seen in early morning, glancing among the leaves, hovering over the flower clusters. In the open glades, also, it was abundant about the wild honeysuckle and flowering shrubs. It was easily approached, and many were caught for me by the little mountain boys, with native bird-lime, the juice (inspissated) of the bread-fruit tree.

"I did not find it anywhere common on the east, or Atlantic side of the island. Took a nest and two eggs in June. It breeds later in the season than the smallest species (the Crested). Nest built in bread-fruit tree. Have nests of the three species.

"Length, ♂, 5 in.; alar extent, $7\frac{1}{2}$; wing, $3\frac{3}{8}$.

"Length, ♀, 5 in.; alar extent, $7\frac{1}{8}$; wing, 3."

This would seem to be a very abundant species, as Mr. Ober procured about fifty specimens. Most of these bear evidence of having been captured with bird-lime. The female differs only in the color of the throat being somewhat duller.

Mr. Ober speaks of having obtained "nests of the three species"; but none have been received.

25. *Eulampis holosericeus* (Linn.).

"Green or Blue-throated Hummingbird."

"This is not so abundant as the others. It prefers shade and seclusion. I noticed the curious habit first in this species, that it possesses in common with the larger, of flitting about in the dark forest, where a

gleam of light would penetrate. It would dart and double with rapidity, occasionally fluttering on suspended wing, like a Hawk, then dart off to a near twig, whence, after resting a while, it would renew its forage upon the diminutive insects sporting in the ray of dusky light.

"Procured a nest and two eggs, in June, from a 'cactus' tree."

"Length, ♂, $4\frac{1}{2}$ in.; alar extent, 6; wing, $2\frac{1}{2}$."

26. *Thalurania wagleri* (Less.).

"White-throat Hummer." September, 1877.

"This bird I found tolerably abundant, principally in the shady mountain paths of the 'high woods'. I saw but one before (earlier in the year) in March, while on my way to the Boiling Lake. It may be the young of No. 368 or 369, but of this you can judge, as I send specimens of each kind. Inhabits the mountains.

"Length, ♀, $4\frac{1}{4}$ in.; alar extent, 6; wing, $2\frac{3}{4}$."

Mr. Ober's note given above refers to the female of this species, of which two examples were sent in his last collection; also one male, No. 369; on the label of this specimen he wrote, "Purple-throat Hummer, ♂?. Length, $4\frac{1}{2}$ in.; alar extent, 6; wing, $2\frac{1}{2}$." (No. 368 is *Eulampis holosericeus*.) This is the first allusion he has made to its being a distinct species, which is difficult to account for, as the male is also very different in appearance from the three other species found abundantly in the island. In his first collection, seven males of *T. wagleri* were sent, but there is no note or any comment to lead to the supposition that he considered it a fourth species—the three regular forms being the only ones spoken of.

The female of this species appears to have been more rarely obtained than the male.

It has the crown and upper tail-coverts bluish-green, the upper plumage and wing-coverts dark green tinged with golden; the middle tail-feathers are golden bronze, ending with greenish-blue; the other tail-feathers are greenish-blue, with their bases golden bronze, and ending with grayish-white; the lores, a line under the eye, and the ear-coverts are black; the under plumage is ashy-white; the bill is entirely black.

The procurement of the female establishes this species as being resident in Dominica.

27. *Orthorhynchus exilis* (Gm.).

"Small Crested Hummer."

"This species is called by the natives, 'Fou, Fou,' or 'crazy, crazy,' from its eccentric motions in the air.

"It is not uncommon along the coast and in the lower valleys. Almost the only species on the Atlantic side in April and May. Very abundant everywhere. Took first nest, March 20, in Shawford Valley; found others as late as June 20, at Batalie, on sea-coast.

"In order of numerical abundance this species can be first, the Crimson-throat second, the Blue or Violet-breast third.

"Length, $3\frac{1}{2}$ in.; alar extent, $4\frac{3}{4}$; wing, 2, ♂."

Fam. CYPSELIDÆ.

28. *Chætura poliura* (Temm.).

“Swift.

“This bird only appears after a rain, then in great numbers, darting swiftly about, disappearing as soon as it has ceased. In March saw but three at the Mountain Lake, 2,300 feet. In June they had descended to the valleys, and were even sporting about the seashore.

“They live and breed among the cliffs, high up the mountains and near the waterfalls of the Roseau Valley. Abundant also at Batalie, lower down the coast.

“Length, ♂, $4\frac{5}{8}$ in.; alar extent, $10\frac{1}{2}$; wing, $3\frac{7}{8}$.”

I have never seen an example of *C. poliura*, but as the bird under investigation agrees in plumage quite well with the description of that species given by Mr. Sclater (P. Z. S. 1865, p. 611), I have called it so provisionally; it differs, however, in dimensions, the wing especially being shorter.

29. “Swift.”

“A species of Swift, intermediate in size between the small Swift and the large Martin.”

This species has not yet been obtained.

Fam. ALCEDINIDÆ.

30. *Ceryle alcyon* (Linn.).

“Kingfisher.”

“Seen in April on the windward side of Dominica, and again in September on the leeward, or Caribbean side. In September it appears more plentiful. Undoubtedly a resident.”

No specimen sent, but is this species without much doubt.

Fam. CUCULIDÆ.

31. *Coccyzus minor* (Gm.).

“Cuckoo; Manioc.”

“Not very plentiful; unsuspicious, stupid; its cry similar to that of Yellow-billed Cuckoo, but more prolonged, sharper, and harsher.

“Nesting in May; inhabits the low shrubs and trees of old clearings.

“Length, ♂, 13 in.; alar extent, $16\frac{1}{2}$; wing, $5\frac{1}{2}$.

“Length, ♀, $13\frac{1}{2}$ in.; alar extent, 17; wing, $5\frac{1}{2}$.”

Fam. PSITTACIDÆ.

32. *Chrysotis augusta* (Vig.).

“‘Cicero.’

“Except in the rainy season, this bird can only be found in the high mountains, where grow the mountain palm, *gomier*, *bois diable*, and other

trees of mountain growth, upon the seeds of which it feeds. It is there abundant, yet shy and difficult to approach. Its cry is harsh, resembling the call of a Wild Turkey. Morning and evening they call one to another for perhaps an hour; during the rest of the day they remain silent, except for an occasional cry. When a gun is fired, they all cry out, and then keep perfect silence. They do not seem to associate in flocks at this season, like the Parrot, but are found more often in pairs. They breed in the hollow tops of high trees, and the young are rarely taken. When caught young, they readily learn to talk. The only manner in which one is secured alive is by being wounded.

"It descends to the valleys in the rainy season to some extent, but prefers the mountains. At that time they are very fat, excellent eating, and much hunted.

"I made an excursion into their mountain fastnesses, camping on their feeding grounds, but only secured three (though assisted by the Carib hunters), the country was so wild and the birds so shy.

"Length, ♂, 21 in.; alar extent, 35; wing, 11.

"Length, ♀, 22 in.; alar extent, 36; wing, 12."

As specimens of the Imperial Parrot are exceedingly rare in collections, and a description of it not readily available, I thought that one taken from the examples before me might prove useful.

The male has on the front adjoining the bill a narrow line of a dark warm brown color; the feathers of the crown and occiput are of a rather dull bluish-green, with lighter terminations; the feathers of the hind neck, and extending around in front, are bronzy-green, with a broad subterminal band of dark bluish-purple, and ending with black; the feathers of the back, wing-coverts, flanks, and upper tail-coverts are of a bright, rather dark green, conspicuously edged with lighter or verditer-green; these terminal edgings are crossed with waving dark marks like water-lines; the tail-feathers are reddish-brown, having their bases green for a short space, the two middle feathers show more green; the edge of the wing is scarlet (not the flexure); the primaries have their outer webs bright dark green for two-thirds their length, the terminal third of a brownish-purple; the first quill is entirely, and the inner webs of the others are of a dark purple; all but the first primary have their outer webs incised; the secondaries have their outer webs green; on the outer two a speculum of scarlet; the inner webs are dark purple; on the chin and sides of the throat adjoining, the feathers are dark brown, with coppery terminations; the ear-coverts are brown, ending with light bluish; the feathers of the lower part of the throat, the breast, and abdomen are bronzy dark olive, broadly marked subterminally with an opalescent band of violet-purple and light blue, changeable in different lights, their terminal margins are black; the upper mandible is dark horn-color, with a whitish mark on its side at the base; the under mandible is lighter; the feet blackish-brown.

The female specimen has the colors a little duller, and the speculum less bright, but it may be possibly younger.

33. "Parrot."

"Not abundant.

"This bird, about the size of our Northern Carolina Parrot, but more robust, is very shy, keeping mainly to the higher mountains; sometimes descending to the inner valleys, to feed upon the wild guavas.

"It is sometimes captured by being wing-broken, and takes kindly to confinement, but unlike its larger brother, the Cicero, does not learn to talk. It congregates in small flocks. It is oftener shot in the months between September and February. A very beneficent law of Dominica prohibits the shooting of Parrots, Ciceros, Ramiers, &c., in any other months, thus ensuring protection during the breeding season."

This species was not obtained by Mr. Ober.

Fam. STRIGIDÆ.

34. *Strix flammea* var. *nigrescens*, Lawr.

"Owl. 'Shawah.'

"Very rare; its cry even is seldom heard. It haunts principally the mountains and higher valleys; builds its nest in a hollow tree, or in the hollow of a large limb, and lays eggs elliptical in shape, white and granular. In this case they were three in number, and from the appearance of the ovules, were the full complement. They were newly laid, September 19."

I find this to be a very dark variety of *Strix flammea*. At my request, Mr. Ridgway sent me a specimen of the dark-plumaged form (var. *guatemalæ*, from Costa Rica), spoken of in N. A. Birds, v. 2, p. 14. On comparison, the difference is very marked: the example from Costa Rica is above brown, intermixed with rufous, and closely freckled with fine whitish vermiculations; it is also marked, not closely, with whitish ovate spots surrounded with black; the color below is dark reddish-ochraceous, with black sagittate spots. The sex not given. It measures, length, 14½ in.; wing, 13; tail, 6; tarsus, 2¾.

The male from Dominica has the upper plumage of a fine blackish-brown, rather sparsely marked with small white spots; the tail is crossed with alternate bands of brown and light dull ochraceous freckled with brown; the wings are the color of the back, somewhat intermixed with rufous; the under plumage is light reddish-ochraceous, marked with small round black spots (the color is lighter than the under plumage of the Costa Rica specimen); the ends of the ruff-feathers are dark reddish-brown; feathers around the eye, black; the face is of a light reddish fawn color. "Bill white; iris deep chocolate, half an inch in diameter."

Length (fresh), 13 in.; wing, 10; tail, 4½; tarsus, 2.

The female is of the same dark color above, with the white spots so minute as to be scarcely perceptible; the tail is darker; the under plumage of a darker reddish-ochraceous than in the male (not so dark

as that of the Costa Rica specimen), a few roundish black spots on the breast; on the abdomen the markings are in clusters, and irregular in form.

Length (skin), 13 in.; wing, $9\frac{1}{2}$; tail, $4\frac{3}{4}$; tarsus, $2\frac{1}{8}$.

Besides its much darker upper plumage, the Dominican form is of much smaller dimensions.

The color of the eggs is dead white; they measure in length 1.60 by 1.22 in breadth.

Fam. FALCONIDÆ.

35. *Pandion haliaetus* (Linn.).

"Fish-hawk."

"Seen circling over the sea in September."

36. *Buteo pennsylvanicus* (Wils.).

"'Mal fini.' St. Marie, Indian country.

"This bird courses above the valley, uttering its cry of 'Mal fini, fini'. It is not abundant; eats lizards as well as small birds. The largest of the Hawks here resident. Iris amber.

"Length, ♂, 15 in.; alar extent, 32; wing, $10\frac{1}{2}$.

"Length, ♀, 15 in.; alar extent, 32; wing, 10."

37. *Tinnunculus sparverius* var. *antillarum* (Gm.).

"'Glee glee.' Nowhere abundant.

"Length, ♂, $10\frac{1}{2}$ in.; alar extent, 20; wing, $6\frac{3}{4}$."

The two specimens sent were submitted to Mr. Ridgway for determination; he wrote me as follows:—"The *Dominica Tinnunculus* is identical with that from St. Thomas, St. Bartholomew, and Porto Rico. It is what I have called '*sparverius* var. *dominicensis*', but I find upon further investigation that it should bear the name of *antillarum*, Gm.—*dominicensis* being, as I now conclude, the bird which I have called *leucophrys*." Mr. Ridgway also wrote:—"You may mention that I have a male *T. sparveroides*, in the plumbeous plumage, from South Florida."

Fam. FREGATIDÆ.

38. *Fregata aquila* (Linn.).

"Man o' War Hawk; Frigate Pelican."

"Often seen flying at great height; said to breed on an inaccessible cliff on the southeastern side of the island."

Fam. PHÆTHONIDÆ.

39. *Phæthon flavirostris*, Brandt.

"Tropic Bird. Abundant.

"Breeds in the cliffs near the Lime Plantation of Batalie, the property of Dr. Imray. They also breed in the cliffs of Mount David, near

Roseau. They appear from out their holes early in the morning, go out to sea to fish and return at 9 or 10; coming out again in the afternoon. A road winds at the base of the cliff, and thus they can be closely observed. They are said to reside here the year through, and commence incubating in April.

"Length, ♂, 23 in.; alar extent, 36; wing, 11½.

"Length, ♀, 27 in.; alar extent, 36; wing, 11½."

Fam. PELECANIDÆ.

40. *Pelecanus fuscus* (Linn.).

"Brown Pelican."

"One or two seen; does not breed here, but probably on the nearest sandy island."

Fam. ARDEIDÆ.

41. *Ardea candidissima* (Gm.).

"Gaulin blanc.' Not common.

"In such rivers as that at Hatton Garden, which runs a long distance through a tolerably level valley, with broad shallows, banks well lined with bushes, with deep holes well stocked with fish, this bird is often found. Iris pale yellow.

"Length, ♂, 21½ in.; alar extent, 35; wing, 10½ in."

42. *Ardea cærulea*, Linn.

"Crabier noir."

"Shot in a stream far up the mountains. Iris straw-color.

"Length, ♀, 21½ in.; alar extent, 37; wing, 10½."

43. *Butorides virescens* (Linn.).

"Green Heron. Common.

"Breeding season commenced in April; found eggs in June. Iris yellow.

"Length, ♀, 19½ in.; alar extent, 26; wing, 7¼."

Fam. COLUMBIDÆ.

44. *Columba corensis*, Gm.

"Ramier."

"Abundant in the high woods, never touches earth; makes its nest in the high gomier trees in May. Shot in numbers in the rainy season, then very fat and most delicious eating. Iris orange, shot with gold, with an inner circle around of darker color.

"Length, ♂, 16 in.; alar extent, 28; wing, 9."

45. *Zenaida martinicana*, Bp.

"Tourterelle."

"Breeds on rocks and cliffs along the coast (Caribbean), very plenti-

ful. In the mountains not numerous; abundant in Indian country, coming about the huts even, not being troubled there. Found eggs in June at Batalie.

"Length, ♂, $12\frac{1}{2}$ in.; alar extent, 19; wing, 7."

46. *Chamæpelias passerina* (Linn.).

"Ground Dove. 'Bagas.'

"Not numerous on the hills; on Grand Savannah, near Batalie, Caribbean coast, abundant. Found eggs in June; the nest, a frail platform of grass stalks and sticks, placed on an old stump.

"Length, ♀, $6\frac{3}{4}$ in.; alar extent, $10\frac{1}{4}$; wing, $3\frac{1}{2}$."

47. *Geotrygon montana* (Linn.).

"'Perdix rouge', ♂; 'Perdix noir', ♀.

"Not uncommon in the high woods; called Perdix or Partridge; robust; strong in short flight, and frequenting the ground; it more resembles that bird than a Dove. Iris yellow.

"Length, ♂, $10\frac{1}{2}$ in.; alar extent, $19\frac{1}{2}$; wing, $6\frac{1}{2}$.

"Length, ♀, $10\frac{1}{4}$ in.; alar extent, 18; wing, 6."

The two eggs sent are of a rather light salmon color, and immaculate; they measure 1.19 by .89.

Fam. CHARADRIIDÆ.

48. *Charadrius virginicus*, Borkh.

"Golden Plover."

"Arrives in flocks, frequenting the 'Grand Savannah', staying but a short time."

49. *Streptopelia interpres* (Linn.).

"Only one seen, at Scott's Head. The flocks of migratory Plover and Curlews visit Dominica but little, preferring lower islands, like Antigua and Barbuda to the rocky islands, where their favorite food is necessarily scarce.

"Length, 9 in.; alar extent, $18\frac{1}{2}$; wing, 6."

Fam. SCOLOPACIDÆ.

50. "Sandpiper."

Species undetermined; seen, but not obtained.

51. *Tringoides macularius* (Linn.).

"A resident species. In the hurricane months, the island is visited by numberless flocks of Plover. No other Sandpiper or Plover (I think) resides here.

"Length, ♀, $7\frac{3}{4}$ in.; alar extent, $12\frac{1}{4}$; wing, $3\frac{3}{4}$."

Fam. LARIDÆ.

52. "Tern."

"Not procured, but I think is *Sterna stolidæ*."

53. *Sterna antillarum* (Less.).

"Tern."

"Very few seen; principally about Scott's Head, the southernmost point of the island.

"Length, ♂, 8½ in.; alar extent, 18½; wing, 6½."

54. *Sterna fuliginosa* (Gm.).

"'Twa oo.'

"When I reached Dominica, September 15, large flocks of this species were skimming the water, apparently feeding upon the fish. There were hundreds. Wishing to get into the mountains at once, I neglected to get this bird, thinking it would be on the coast upon my return. In a week, however, the squally weather which had brought them in had passed, and they also had disappeared. I was able only to procure this mutilated specimen, which I send with regret."

55. *Sterna anæsthesa*, Scop.

"Tern."

"St. Marie, Atlantic coast, April 20. This bird made its first appearance a week ago, coming from the open ocean, to breed upon a rock off this stormy shore. My Indian boys procured twenty eggs from the rock. The birds leave the island so soon as their young are fledged.

"Length, ♂, 14½ in.; alar extent, 29; wing, 10½.

"Length, ♀, 15½ in.; alar extent, 30; wing, 10¾."

Fam. PROCELLARIDÆ.

56. "Diablotin."

"Twenty years ago it was abundant. Said to have come in from the sea in October and November, and to burrow in the tops of the highest mountains for a nest. In those months it incubated. The wildest stories are told about it, and but for the evidence of such a man as Dr. Imray, I should treat it as a myth. Doubtless as you write, it may be identical with the Jamaica Petrel."

On first receiving the account of this bird from Mr. Ober, I wrote to Professor Baird, suggesting that it might be *Puffinus obscurus*, which species was found breeding in the Bahamas by Dr. Bryant. Professor Baird replied that he thought it was more likely to be *Prion Caribbaea*, discovered in the Blue Mountains of Jamaica a few years since.

It is quite possible it may be an undescribed species, and its acquisition is most desirable.

It goes and comes, doubtless, mostly if not altogether at night. If the burrows made by it could be found when the birds are incubating, probably they could be unearthed in the daytime, and thus be secured.

Its movements being like those attributed to evil spirits, probably suggested the name by which it is known.

Dr. Bryant (Proc. Boston Soc. of N. H. v. 7, p. 132) gives the following account of *Puffinus obscurus*:—"The nest is always placed in a hole or under a projecting portion of the rock, seldom more than a foot from the surface, and never, as far as my experience goes, out of reach of the band. On being caught they make no noise, and do not resist at all. Why these birds and the Stormy Petrels never enter or leave their holes in the daytime, is one of the mysteries of nature; both of them feeding and flying all day, yet never seen in the vicinity of their breeding places before dark."

NOTES ON A COLLECTION OF FISHES FROM CLACKAMAS RIVER, OREGON.

By DAVID S. JORDAN, M. D.

The United States National Museum has lately received from Mr. Livingston Stone a small collection of fishes obtained by him from the Clackamas River, a tributary of the Columbia in Oregon. The collection comprises only six species, but each species (excepting *Salmo tsuppitch*) is represented by several specimens, all in excellent condition; and it so happens that each one of these is a species of special scientific interest, and one concerning which our knowledge has for one reason or another been incomplete. Four of these species were first described by Richardson (Fauna Boreali-Americana, 1836), viz., *Oncorhynchus quinnat*, *Salmo tsuppitch*, *Salmo clarki*, and *Gila oregonensis*; another, *Acrochilus alutaceus*, was first made known by Professor Agassiz (Am. Journ. Sci. and Arts, 1855); and the last, *Salvelinus spectabilis*, by Dr. Girard in 1856.

I. ONCORHYNCHUS QUINNAT (Richardson) Günther.

California Salmon. Columbia Salmon. Quinnat Salmon.

1836—*Salmo quinnat* RICHARDSON, Fauna Bor.-Am. iii, p. 219, (described from notes by Dr. Gairdner).

Salmo quinnat DEKAY, Fauna New York, Fishes, p. 242, 1842, (copied).

Salmo quinnat STORER, Synopsis Fi h. N. A. p. 196, 1846, (copied).

Salmo quinnat HERBERT, Frank Forrester's Fish and Fishing, Supplement, p. 31, 1850.

Salmo quinnat GIRARD, Proc. Ac. Nat. Sc. Phila. viii, p. 217, 1856.

Salmo quinnat GIRARD, Pac. R. R. Rep. Fishes, p. 306, pl. 67, 1858.

Salmo quinnat SUCKLEY, Nat. Hist. Wash. Terr. p. 321, 1860.

Oncorhynchus quinnat GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 158, 1866, (compiled).

Salmo quinnat SUCKLEY, Monograph Genus Salmo, Rept. U. S. Fish. Comm. p. 105, 1874.

Salmo quinnat NELSON, Bull. Ills. Mus. Nat. Hist. i, p. 43, 1876, (Illinois River).

Salmo quinnat HALLOCK, Sportsman's Gazetteer, p. 359, 1877.

Oncorhynchus quinnat JORDAN, Man. Vert. ed. 2d, p. 357, 1878.

Oncorhynchus quinnat JORDAN, Catalogue Fresh-water Fishes N. A. p. 431, 1878.

Salmo quinnat, U. S. Fish Comm. Repts., and of writers on Salmon and fish culture generally.

- 1856—*Fario argyreus* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 218.
Fario argyreus GIRARD, Pac. R. R. Surv. Rep. Fishes, p. 312, pl. 70, 1858.
Salmo argyreus SUCKLEY, Nat. Hist. Wash. Terr. p. 326, 1860.
Salmo argyreus SUCKLEY, Monograph Salmo, p. 110, 1874.
 1861—*Salmo warreni* SUCKLEY, Ann. Lyc. Nat. Hist. N. Y. vii, p. 308.
Salmo warreni SUCKLEY, Monograph Salmo, p. 147, 1874.
Salmo warreni JORDAN & COPELAND, Check List, p. 144, 1876.

This species, the most abundant and most valuable of the *Salmonide* of the Pacific coast, is represented in the present collection by numerous partly grown specimens, some black-spotted and some nearly plain silvery. The only question which now arises in the synonymy of this species is as to its distinctness from its congener *O. nerka* (Walbaum), (*O. lycaodon* Pallas). The slender, more fusiform, and less compressed form of the latter species, as well as its fewer branchiostegals and less forked tail, seem to indicate specific difference. The types of *Fario argyreus* Girard, I have examined. They are two in number, each about 8 inches long, and are evidently young *quinnats*. The original types of *Salmo warreni* are apparently lost. There is, however, a bottle of small silvery fishes, young individuals of *quinnat*, in the National Museum, labelled by Dr. Suckley "*Salmo warreni*?" There can be little doubt that the original types of *Salmo warreni* were similar specimens of a young *Oncorhynchus*, most likely the young of *O. quinnat*.

There can be no possible doubt of the entire generic distinctness of the genus *Oncorhynchus* from *Salmo*, although the characters assigned to *Oncorhynchus* by Dr. Suckley have no such value. The great development of the anal fin and the peculiar form and dentition of the vomer are of much more importance than the hooked jaws of the male, although neither character was noticed by Dr. Suckley. Indeed, this author includes most of the *Oncorhynchi*, under one name or another, in his subgenus *Salmo*. Thus the species termed by him *quinnat*, *confluentus* (= *keta*), *argyreus* (= *quinnat*), *paucidens* (= *nerka*), *truncatus* (= *nerka*), *richardi* (= *nerka*), *kennerlyi*, and *warreni* (= *quinnat*), are all hook-jawed species, with a long anal fin and an increased number of branchiostegals, yet they are all referred by Dr. Suckley to his subgenus *Salmo* proper.

An examination of the specimens of *Oncorhynchus* in the National Museum, including all of Dr. Suckley's types excepting *richardi* and *warreni*, has convinced Dr. Gill and myself that they all belong to five species, *O. gorbuscha*, *O. keta*, *O. nerka*, *O. quinnat*, and *O. kennerlyi*. These are divisible into two very strongly marked subgenera, or perhaps even distinct genera,—*Oncorhynchus*, including the first four species named, and *Hypsifario*, Gill, including only *kennerlyi*. *O. kennerlyi* is very much smaller than the other species, and is much more compressed and of a different form. Its form seems to me, however, rather an exaggeration of that of *O. quinnat* than a distinct type, and the resemblance is almost as great between *quinnat* and *kennerlyi* as between *quinnat* and *gorbuscha*.

The species of *Oncorhynchus* at present admitted by Dr. Gill and myself may be briefly compared as follows:—

- a. Body more elongate, heavier forward and less compressed than in the next; jaws in the adult males very unequal; the lower jaw prolonged and hooked upwards; the upper jaw still more elongate and curled over the tip of the lower, the profile of the forehead being concave when viewed from the side; teeth of the premaxillaries and of the tip of the lower jaw greatly enlarged and hooked (Subgenus *Oncorhynchus*.)
- b. Scales very small, in more than 200 transverse rows; smaller on caudal peduncle than on flanks; form much distorted in the adult males, the fleshy hump at the shoulders being greatly developed, and the caudal peduncle slender and rather elongate; the jaws greatly prolonged and curved; size small. (Pacific coast and streams, Washington to Kamtschatka.) *GORBUSCHA*.*
- bb. Scales medium, in about 170 (155 to 180) transverse rows; form distorted, but less so than in the preceding, the fleshy hump considerably developed in the males, and the jaws greatly elongated and hooked; branchiostegals about 16. (Pacific coast and streams, Oregon to Kamtschatka.) *KETA*.†
- bbb. Scales large for the genus, in about 133 transverse rows.
- c. Form elongate, not greatly compressed, the greatest depth in advance of the middle of the body; the males with the caudal peduncle rather slender, and with a well-marked fleshy hump, and with the jaws much elongated and distorted; caudal fin feebly forked; branchiostegals about 13. (Pacific coast and streams, California to Kamtschatka.) *NERKA*.‡
- cc. Body elongate, compressed, the greatest depth (in female and immature specimens at least) being just under the dorsal fin; depth of body one-fourth of length, or a little more; head moderate, rather bluntly pointed; less distorted in male specimens than in the preceding species; maxillary shortish, curved, reaching somewhat beyond eye; caudal fin more or less forked; branchiostegals 15 or 16. (Coast and streams, California to Alaska) *QUINNAT*.
- aa. Body oblong, very strongly compressed, the dorsal region much elevated; a nearly even slope from the snout to the base of the dorsal fin; dorsal fin unusually far back, the first ray being behind the middle of the body; head long, deep, compressed, but still wide; mouth extremely large and very oblique; the jaws about equal in the females; in the males, the lower jaw protruding beyond the upper, which is curled up like the snout of a snarling dog, showing the enlarged canines, the premaxillaries never hooking over the lower jaw, as is the case with *Oncorhynchus* proper; dentition as in typical *Oncorhynchus*.
(Subgenus *Hypsifario* Gill.)

**ONCORHYNCHUS GORBUSCHA* (Walb.) Gill & Jordan.—*Gorbuscha*, Pennant, Arctic Zoology.—*Salmo gorbuscha*, Walbaum, Artedi Gen. 1792.—*Salmo gibber*, Bloch, Schneider, Ichthyologia, 1801.—*Salmo proteus*, Pallas, Zool. Rosso-Asiatica, 1811.—*Salmo gibber*, Suckley, 1861.—*Oncorhynchus gorbuscha*, Jordan, Man. Vert. ed. 2d, 1878.

†*ONCORHYNCHUS KETA* (Walbaum) G. & J.—*Keta* vel *kayko*, Pennant, Arctic Zoology.—*Salmo keta* vel *kayko*, Walbaum, 1792.—*Salmo keta* vel *kayko*, Bloch, Schneider, 1801.—*Salmo lagocephalus*, Pallas, 1811.—*Salmo scouleri*, Richardson, 1836.—*Salmo confluentus*, 1861.—*Oncorhynchus keta*, Jordan, Man. Vert. ed. 2d, 1878.

‡*ONCORHYNCHUS NERKA* (Walb.) Gill & Jor.—*Narka*, Pennant, Arctic Zoology.—*Salmo nerka*, Walbaum, 1792.—*Salmo lycodon*, Pallas, 1811.—*Salmo japonensis*, Pallas, 1811.—? *Salmo paucidens*, Richardson, 1836.—*Salmo consuetus*, Richardson, Voyage of the Herald, 1854.—*Salmo dermatinus*, Richardson, L. c. 1854.—*Salmo canis*, Suckley, 1861.—*Salmo cooperi*, Suckley, 1861.—*Salmo scouleri*, Suckley, 1861, (not of Rich.).—*Salmo truncatus*, Suckley, 1861.—? *Salmo richardi*, Suckley, 1861.—*Oncorhynchus lycodon*, Günther, 1867.—*Oncorhynchus nerka*, Jordan, 1878.

d. Depth of body about .29 of length, its width only about .10; length of head .29 of length; the interorbital space about .09; maxillary, .12; mandible, .19; scales moderate, thin, partly imbedded in the skin along the back, but not closely imbricated, in number about 20-135-20; branchiostegals about 15; dorsal fin rather high—higher than long; adipose fin long and narrow, somewhat spatulate; caudal fin well forked; general color red, somewhat spotted above; size small. (*Habitat*.—Pacific coast streams, Sacramento River to Fraser's River.)KENNERLYI.*

The series of *Oncorhynchus* in the National Museum is by no means so complete as is desirable, except in the case of *O. quinnat* and *O. kennerlyi*. *O. keta*, *O. nerka*, and *O. gorbuscha* are represented only by skins, mostly dried and moth-eaten, and all in poor condition. A fuller series may show that more than five good species exist, or it may show that *O. quinnat* is really only a variety of *O. nerka*.

2. SALMO TSUPPITCH Richardson.

Tsuppitch Salmon. Black Trout of Lake Tahoe.

1836—*Salmo tsuppitch* RICHARDSON, Fauna Bor.-Am. Fishes, p. 224.

Salmo tsuppitch DEKAY, New York Fauna, Fishes, p. —, 1842.

Salmo tsuppitch STORER, Synopsis, p. 197, 1846.

Salmo tsuppitch HERBERT, Frank Forrester's Fish and Fishing, Suppl. p. 39, 1850

Salmo tsuppitch SUCKLEY, Nat. Hist. Wash. Terr. p. 327.

Salmo tsuppitch GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 118, 1867.

Salmo tsuppitch SUCKLEY, Monograph Salmo, p. 111, 1874.

Salmo tsuppitch JORDAN, Man. Vert. ed. 2d, p. 358, 1878.

A fine specimen of a trout from the Clackamas River enables me to make a probably correct determination of the hitherto unidentified *Salmo tsuppitch* of Richardson. The specimen seems to be identical with the so called "Black Trout of Lake Tahoe" (not the "Silver Trout of Lake Tahoe", which is the species termed by Professor Gill and myself *S. henshawi*), of which numerous specimens were collected in Lake Tahoe and in Kern River, California, by Mr. H. W. Henshaw. I feel less hesitation in identifying Richardson's *tsuppitch* with this species, from the fact that the fish does not seem ever to have been renamed by later writers. The following description was taken from the Clackamas River specimen.

General appearance of *Salmo henshawi*, but with smaller scales, smaller, shorter head, and smaller mouth, besides wanting the hyoid teeth.

Body elongated, somewhat compressed, the dorsal region moderately elevated. Head rather small, pointed and lengthened, its form quite distinctly conic, less convex than in *spilurus*, the top rather narrow and slightly keeled. Mouth moderate, not large, with rather weak teeth, the maxillary comparatively narrow and not extending much

* *Oncorhynchus kennerlyi* (Suckley) Jor.—*Salmo kennerlyi*, Suckley, 1861.—*Hypsifario kennerlyi*, Gill, 1864.—*Oncorhynchus kennerlyi*, Jordan, 1878.

beyond the eye; opercle more prolonged backwards than in *spilurus*, making the head appear longer. Pectoral fins smaller than in *spilurus*.

Scales small, silvery, 28-180-29.

Caudal fin short, rather faintly forked, but more so than in *spilurus*. Adipose fin rather small. Fins all small, the dorsal of the usual "*salar*" pattern.

Fin-rays: Dorsal, 2, 11. Anal, 2, 10.

Color dark above; head, body, and upper fins with small, round, black spots, very numerous, and nearly as close together before as behind; a few spots on the belly in some specimens.

Measurements of specimen: Length, 12 inches; depth, $.23\frac{1}{2}$ of length to base of caudal; head, $.24\frac{1}{2}$; interorbital width, .07; maxillary, .10; mandible, .15; middle caudal rays, .11; outer caudal rays, .17.

This species may be known from *S. spilurus* by the more forked tail, the longer and slenderer head, and the greater spottiness anteriorly. From *S. irideus*, it may be known by the much slenderer form, larger mouth, longer head, and much larger scales; from *S. henshawi*, which it most resembles, by the shorter head and by the lack of hyoid teeth; and from *S. clarki*, which it also resembles, by the want of hyoid teeth, and other characters.

These black-spotted Salmon of the Rocky Mountain region and Pacific slope belong to a well-marked group, for which the name *Salar*, Valenciennes, may be retained as a subgenus of the genus *Salmo*. Although not by any means so different from the true *Salmo* (type *S. salar* L.) as are the genera *Oncorhynchus*, *Cristiomer* (type *S. namaycush* Walb.), and *Salvelinus* (type *S. salvelinus* L.), it is not impossible that future writers may consider *Salar* as a genus distinct from *Salmo*. The character of a single instead of a double row of teeth on the shaft of the vomer, supposed to distinguish *Fario*, Val., from *Salar*, has no generic value, and probably not even a specific value, at least as hitherto stated. In all the species properly referable to *Salar*, the teeth are arranged alternately, each one pointing to the right or left, in an opposite direction from its neighbor. These teeth are therefore in a sort of quincuncial row, which in many or most instances appears as two distinct rows, and almost always is divided into two anteriorly. Most of the "Salmon-trout" and "Trout" of Europe and Asia belong to this group, "*Salar*". Although most of the species referred to *Fario* belong to *Salar*, it is not certain whether the type of *Fario*, *F. argenteus* Val., from France, is a *Salar* or a true *Salmo*. The figure looks to me like a young Salmon (*S. salar*).

The American species of the subgenus *Salar* which are now considered valid by Dr. Gill and myself may be compared as follows:—

Common characters:—River Salmon, not anadromous, with the vomer comparatively flat and not boat-shaped, its form essentially as in *Salmo* proper, the vomerine teeth extending for some distance along the shaft of the bone in two alternating rows or in one zigzag row, the teeth divergent and directed somewhat forward, not deciduous: scales

moderate, comparatively thin and loose, appearing silvery, especially in fishes which have entered the sea: fins small, the last rays of the dorsal somewhat elongate, the first ray usually less than twice the height of the last ray; caudal fin slightly forked, or more usually truncate, with a slight emargination, double-rounded when spread open: upper parts, especially the back, and the dorsal and caudal fins, more or less thickly covered with small, rounded, black spots: in some specimens, especially those which have been in the sea, these spots are more or less confluent, obscured or even obsolete: species not of the largest size, the sexual peculiarities not strongly marked (Subgenus *SALAR*.)

a. Hyoid bone entirely destitute of teeth.

b. Scales comparatively large, in 120 to 150 transverse series.

c. Body more or less short and deep, compressed, the depth .24 to .33 of length. Head short, bluntish, convex above, obtusely carinate, about .25 of length: mouth small, smaller than in any other of the group, the maxillary bone of moderate width, scarcely reaching beyond the eye, .10 to .11 of length, the mandible about .15: eye large, about .05 of length: caudal fin moderately but very distinctly forked, more so than in any of the other members of the group; first long ray of dorsal about twice the height of the last ray: dorsal, 2, 11; anal, 2, 11: scales about 28-135-28, varying considerably, but in all cases decidedly larger than in any other of our species of *Salar*. Rivers from California to British Columbia west of the Sierra Nevada *IRIDEUS*.

bb. Scales comparatively small, in 165 to 205 transverse series.

d. Caudal fin somewhat forked: head rather small, about .25 of length, pointed and lengthened, conical, the upper outline rather narrow and not much convex, the carina slight: mouth moderate, the maxillary comparatively narrow and extending much beyond the eye: opercle considerably prolonged backward: scales small, 28-180-29: depth about .24 of length: body nearly equally spotted before and behind. Rivers west of Sierra Nevada *TSUPPITCH*.

dd. Caudal fin double-rounded or truncate, not at all forked in the adult.

e. Head not notably broad and flat, heavy and proportionally short, its upper outline strongly convex, both longitudinally and transversely: mouth very large, the maxillary extending much past the eye in the adult, the opercle not especially prolonged backward: dorsal fin notably high behind, its last rays more than $\frac{2}{3}$ the height of the first, some of the middle rays shortest: scales small: depth of body about .24 of length: spots on body most numerous posteriorly. Rocky Mountains to the Sierra Nevada south of the Columbia region *SPIURUS*.

x. Scales medium, in 170 to 190 transverse rows: top of head gibbous, obtusely carinated. Headwaters of Rio Grande, Bear River, etc.

Subspecies *spilurus*.*

xx. Scales small, in 190 to 205 rows: head more or less sharply carinated, much less gibbous. Generally distributed.

Subspecies *pleuriticus*.†

aa. Hyoid bone with an elongate band of small teeth between the bases of the first and second pairs of gill-arches (readily scraped off by careless observers, and possibly sometimes naturally deciduous).

* *Salmo spilurus* Cope, 1872.—*Salmo stomias* var. *spilurus* Jordan, 1878.

† *Salmo pleuriticus* Cope, 1872.—*Salmo stomias* var. *pleuriticus* Jordan, 1878.

- f.* "Head large, broad, flat, not keeled, 4.25 in total length, equal to depth of body: muzzle obtuse: eye nearly 5 times in head: scales (small, as in var. *pleuriticus*) 42 below first dorsal ray: dorsal fin equidistant: caudal fin not notched. Kansas River."—(Cope.).....*STOMIAS*.*
- ff.* Head comparatively large, and long acuminate, .25 of length, its outline as a whole pointed, but the muzzle itself bluntish, its upper surface not much convex in either direction, very slightly carinated: mouth medium, the maxillary moderate, .12 of length, not reaching much beyond eye: patch of hyoid teeth small, and comparatively weak: body elongate, not greatly compressed, the depth .25 of length: dorsal fin small, its last rays $\frac{3}{4}$ the height of the first: caudal fin short, quite distinctly forked: scales small, in 130 to 184 transverse rows: colors rather dark, back and sides more or less profusely covered with small rounded spots. Streams of California west of the Sierra Nevadas; Lake Tahoe.....*HENSHAWI*.†
- fff.* Head comparatively short and thick, .22 to .25 of length, its outline more convex, more or less distinctly carinated above: mouth rather small, but larger than in *iridens*, the maxillary not reaching far beyond the eye: patch of hyoid teeth well developed: body moderately elongate, compressed; depth .24 of length: dorsal fin rather low, its last rays $\frac{3}{4}$ the height of the first: caudal fin scarcely forked, rather more so than in *spilargus*: scales moderate or rather small: colors variable, the back and sides usually profusely, but variably spotted, silvery in sea-run individuals. Rio Grande to Upper Missouri and west to the Pacific.....*CLARKI*.
- y.* Scales moderate, in 155 to 165 rows; chiefly west of the Rocky Mountains.....Subspecies *clarki*.
- yy.* Scales small, in 165 to 170 rows; chiefly east of the Rocky Mountains.....Subspecies *aurora*.

The American species of this subgenus *Salar* are very closely inter-related, and might almost be considered as varieties of a single polymorphous species. The occurrence of forms apparently intermediate prevents me from considering *aurora* and *pleuriticus* as distinct species, although they may usually be readily recognized.

Of the true subgenus *Salmo*, there seems to be but one species in America, the *Salmo salar*, our specimens being, so far as I can see, precisely identical with the European. The land-locked Salmon of Maine, *Salmo sebago*, Girard, does not differ by any constant character from *Salmo salar*, and its permanent residence in fresh water is the only character of which I know on which a subspecies *sebago* could be based. Land-locked Salmon from Bergen, Sweden, in the United States National Museum, and land-locked Salmon from Sysiadobsis Lake, Maine, are to my eye precisely alike, and both are *Salmo salar*, Linnaeus.

* *Salmo stomias* Cope, 1872.—I have not seen this species, but Professor Cope writes me that if I had, I would certainly consider it specifically distinct from *S. pleuriticus*. Since the above was in type, I have examined a head of a large specimen of *Salmo stomias* from the Upper Missouri. It agrees fully with Professor Cope's description. As it is a species with well-developed hyoid teeth, it is related to *S. clarki*, and *S. henshawi*, differing in the peculiar form of the head and the smaller size of the scales.

† *Salmo henshawi* Gill & Jordan, Jordan, Man. Vert. ed. 2d, p. 355, 1878.—This fine species is named in honor of Mr. H. W. Henshaw, the well-known ornithologist, who first brought specimens from Lake Tahoe.

3. SALMO IRIDEUS Gibbons.

Pacific Coast Brook Trout.

- 1855—*Salmo iridea* GIBBONS, Proc. Cal. Ac. Nat. Sc. p. 36.
Salar iridea GIRARD, Proc. Ac. Nat. Sc. Phila. p. 220, 1856.
Salar iridea GIRARD, Pac. R. R. Expl. Fishes, p. 321, 1858, pl. 73, f. 5, and pl. 74.
Salmo irideus JORDAN, Catalogue Fishes N. A. p. 431, 1878.
Salmo irideus GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 119, 1867.
Salmo iridea SUCKLEY, Monograph Genus Salmo, p. 129, 1874.
Salmo irideus JORDAN & COPELAND, Check List, p. 144, 1876.
Salmo irideus HALLOCK, Sportsman's Gazetteer, and of writers on fish and fish-culture generally.
Salmo irideus JORDAN, MUSE. Vert. ed. 2d, p. 358, 1878.
Salmo rivularis AYRES, Proc. Cal. Ac. Nat. Sc. p. 43.
1856—*Fario gairdneri* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 219, (not *Salmo gairdneri* Rich., a species with the "candal fin semilunate" and "no hyoid teeth"; hence neither the present fish nor *S. clarkii* Rich.).
Fario gairdneri GIRARD, Pac. R. R. Expl. Fishes, p. 313, pl. 71, f. 1-4, 1858.
1858—*Fario newberryi* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 224, 1858, (substitute for *gairdneri*).
Salmo newberryi SUCKLEY, Monograph Genus Salmo, p. 159, 1874.
Salmo newberryi JORDAN & COPELAND, Check List, p. 144, 1876.
1858—*Fario clarkii* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 219, (not *Salmo clarkii* Rich.).
Fario clarkii GIRARD, Pac. R. R. Expl. Fishes, p. 314, pl. 71, f. 5-8, 1858.
1860—*Salmo masoni* SUCKLEY, Nat. Hist. Washington Terr. p. 345, (substitute for *clarkii*).
Salmo masoni SUCKLEY, Monograph Salmo, p. 134, 1874.
Salmo masoni JORDAN & COPELAND, Check List, p. 144, 1876.
1860—? *Salmo gairdneri* SUCKLEY, Nat. Hist. Washington Terr. p. 331, (not of Richardson).
? *Salmo gairdneri* SUCKLEY, Monograph Salmo, p. 114, 1874.
1867—*Salmo purpuratus* GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 116, 1867, (in part; probably not of P. Has., whose specimens came from Siberia, = *Salmo mykiss* Walbaum, = *Salmo mukisi* Bloch, both names prior to Pallas, who gives "Mykiss" as the vernacular name of *purpuratus*).

Habitat.—California to British Columbia, in streams of or west of the Sierra Nevada and Cascade Ranges.

This abundant Trout is represented by several specimens. In justification of the above synonymy, I may say that I have examined specimens purporting to be the types of *irideus* Gibbons, *rivularis* Ayres, *newberryi* Girard, *masoni* Suckley, and *gairdneri* Suckley, and that I have no hesitation in considering all (excepting *gairdneri* Suckley) as representatives of a single species.

The type of *S. newberryi*, which Dr. Suckley was unable to find, is a well-preserved young fish, without hyoid teeth. It has a rather wider maxillary than is usual in *irideus* and rather smaller scales (33-146-33), and the vomerine teeth are in a single, somewhat zigzag row. Nevertheless, I believe it to be an *irideus*, with which it agrees in every other respect.

The types of *S. masoni*, the one a moth-eaten skin and the other a specimen in alcohol, are not different in any respect from the ordinary *irideus*. Notwithstanding Dr. Suckley's statement that the scales in his type are "double the size of *irideus*", his typical specimens have each about 130 scales in a longitudinal series, which is about the usual number in *irideus*.

The type of *S. gairdneri*, Suckley, is a large stuffed skin, badly stretched, and in very poor condition. I am not able certainly to identify it.

As Dr. Günther found about 130 rows of scales in his *S. purpuratus*, I have referred it to the present species rather than to *S. clarki*. As elsewhere stated, I consider it rather unsafe to identify *fresh-water* Salmon from America and Asia as belonging to the same species before the species of either region have been critically studied.

4. SALMO CLARKI Richardson.

Subspecies CLARKI.

Salmon Trout of the Columbia.

- 1836—*Salmo clarkii* RICHARDSON, Fauna Boreali-Americana, iii, p. 224.
Salmo clarkii STORER, Synopsis, p. 197, 1846.
Salmo clarkii HERBERT, Frank Forrester, Fish and Fishing, Supplement, p. 40, 1850.
Salmo clarkii SUCKLEY, Nat. Hist. Washington Terr. p. 344, 1860.
Salmo clarkii SUCKLEY, Monograph Genus Salmo, p. 112, 1874.
Salmo clarkii JORDAN, Man. Vert. ed. 2d, p. 359, 1878.
Salar clarkii JORDAN, Catalogue Fishes N. A. p. 430, 1878.
- 1856—*Fario stellatus* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 219.
Fario stellatus GIRARD, Rept. Pac. R. R. Expl. p. 316, pl. 69, f. 5-8, 1858.
Fario stellatus SUCKLEY, Nat. Hist. Wash. Terr. p. 346, pl. 69, f. 5-8, 1860.
Salmo stellatus GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 117, 1867.
Salmo iridea var. *stellatus* SUCKLEY, Monograph Genus Salmo, p. 130, 1874.
- 1856—*Fario tsuppitch* GIRARD, Proc. Ac. Nat. Sci. Phila. viii, p. 218, (not *Salmo tsuppitch* Rich.).
Fario tsuppitch GIRARD, Rept. Pac. R. R. Surv. Fishes, p. 300, 1858.
- 1858—*Salmo gibbsii* SUCKLEY, Ann. N. Y. Lyc. Nat. Hist. vii, p. 1, 1858, (substitute for *tsuppitch* Grd.).
Salmo gibbsii SUCKLEY, Nat. His. Wash. Terr. p. 332, 1860.
Salmo gibbsii GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 119, 1867.
Salmo gibbsii SUCKLEY, Monograph Genus Salmo, p. 141, 1874.
Salmo gibbsii JORDAN & COPELAND, Check List, p. 144, 1876.
- 1861—*Salmo breviceauda* SUCKLEY, Ann. N. Y. Lyc. Nat. Hist. vii, p. 308.
Salmo breviceauda GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 120, 1867.
Salmo breviceauda SUCKLEY, Monograph Genus Salmo, p. 140, 1874.
Salmo breviceauda JORDAN & COPELAND, Check List, p. 144, 1876.

Subspecies AURORA.

Missouri River Trout. Utah Trout. Yellowstone Trout.

- 1856—*Fario aurora* GIRARD, Proc. Ac. Nat. Sc. Phila. viii, p. 218.
Fario aurora GIRARD, Pac. R. R. Surv. Fishes, p. 308, pl. 68, 1858.
Salmo aurora SUCKLEY, Nat. Hist. Wash. Terr. p. 343, 1860.
Salmo aurora GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 119, 1867.
Salmo aurora SUCKLEY, Monograph Genus Salmo, p. 110, 1874.
Salmo aurora JORDAN & COPELAND, Check List, p. 144, 1876.
Salmo clarkii var. *aurora* JORDAN, Man. Vert. ed. 2d, p. 359, 1878.
- 1856—*Salar lewisi* GIRARD, Proc. Ac. Nat. Sci. Phila. viii, p. 219, 1856.
Salar lewisi GIRARD, Pac. R. R. Surv. Fishes, p. 29, pl. 71, 1858.
Salmo (Salar) lewisi SUCKLEY, Nat. Hist. Wash. Terr. p. 348, 1860.
Salmo lewisi GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 122, 1867.
Salmo lewisi SUCKLEY, Monograph Genus Salmo, p. 139, 1874.
Salmo lewisi JORDAN & COPELAND, Check List, p. 144, 1876.

1856—*Salar virginalis* GIRARD, Proc. Ac. Nat. Sc. Phila. viii, p. 220, 1856.

Salar virginalis GIRARD, Pac. R. R. Expl. Fishes, p. 320, 1858.

Salmo (Salar) virgineus SUCKLEY, Nat. Hist. Wash. Terr. p. —, 1860.

Salmo virginalis GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 123, 1867.

Salmo virginalis COPE, Hayden, Geol. Surv. Montana, 1871, p. 469, 1872.

Salmo virginalis SUCKLEY, Monograph Genus Salmo, p. 135, 1874.

Salmo virginalis COPE & YARROW, Zool. Lient. Wheeler's Expl. W. 100th Mer. p. —, 1876.

Salmo virginalis JORDAN & COPELAND, Check List, p. 144, 1876.

1872—*Salmo carinatus* COPE, Hayden's Geol. Surv. Montana, 1871, p. 471, 1872.

Salmo carinatus JORDAN & COPELAND, Check List, p. 144, 1876.

1874—*Salmo utah* SUCKLEY, Monograph Genus Salmo, p. 136, 1874.

Salmo utah JORDAN & COPELAND, Check List, p. 144, 1876.

Examination of a very large series of the Salars with hyoid teeth has convinced the writer that all (excepting *S. stomias* and *S. henshawi*) belong to a single species, although two, and possibly three, or even four subspecies or varieties may be distinguished. For this species the name *Salmo clarki* is the name to be retained, as almost the only important character which Richardson was able to assign to this species is that of the patch of teeth on the hyoid bone. No other species of this group possessing this character is as yet known from the Columbia.

Specimens examined from Utah, from the Rio Grande, from the headwaters of the Missouri, Yellowstone, Platte, and Snake Rivers, as well as the types of *Fario aurora* from the Columbia, possess much smaller scales than typical *clarki* (i. e., *stellatus* Grd.). These may be really specifically distinct, but intermediate specimens occur; and until this Rocky Mountain species can be better defined as distinct from the Columbia River species, it is best to consider it as var. *aurora* of the latter.

The typical specimens of *Fario stellatus* Girard are still preserved. I consider them as typical of *Salmo clarki*. This perfectly distinct species is almost the only one described by previous writers, which Dr. Suckley ventured to discard, he confounding it with *S. irideus*, yet of all our species of *Salar*, *irideus* and *clarki* (*stellatus*) are technically the most distinct.

The types of *S. brevicauda* Suckley are still preserved, but are almost decayed. One of them is certainly a *clarki*, probably sea-run; the other is past recognition.

The types of *Fario aurora* are still preserved in the same condition as when first described and figured. They are well kept as to the bodies, but the scales are all rubbed off, an accident apparently not noticed by Dr. Girard's artist, which accounts for the peculiar squamation shown in the published figure. These specimens are young, and very chubby; but as they have hyoid teeth and show no points of distinction from *S. lewisi* Grd., I identify them as belonging to the same species. The remarks of Dr. Suckley on the description of such specimens as new species are so pertinent that I will quote them here. They would perhaps have sounded better, however, if he himself had suppressed his own *Salmo warreni*, *Salmo gibbsii*, and other more or less purely complimentary species.

"The naming of *Salmonida*, and the description of new species, based on the characters of young, partially grown fish, cannot be too strongly reprobated. There is already too much confusion in the synonymy of the different kinds; and if the practice of describing and naming new species from the characters of unidentified immature individuals is not stopped, the study of the relations of the species will become so complicated, that useful classification will be next to impossible, and the principal object and usefulness of scientific arrangement, such as simplifies the study of natural history in other branches, will be greatly impaired."—(Suckley, Monograph *Salmo*, p. 113.)

The types of *Salar lewisi* are still preserved. The one figured by Girard seems to be a female specimen, in very flabby condition. It is quite deep-bodied and has a smaller head and mouth than is usual in this species. Other specimens from the same waters agree more or less completely in these respects with *S. virginalis*, so that it does not seem possible to consider the Missouri River Trout as even varietally distinct.

The types of *Salmo carinatus* I have not seen. They were from the Yellowstone, and so far as the description is concerned seem to belong to this species.

The types of *Salar virginalis* are likewise preserved. They represent the ordinary form of this species in the Rocky Mountain region, and hence are typical of what I call var. *aurora*.

The original type of *Salmo gibbsii*, a stretched skin in poor condition, is now lost. If the species is not identical with *Salmo clarki*, it is likely to remain uncertain.

Salmo clarki Richardson is identified by Dr. Günther with *Salmo purpuratus* Pallas (*Salmo mykiss* Walbaum) of Kamtschatka. Günther's *Salmo purpuratus*, however, appears to be *Salmo irideus*, and not the present species, and an identification of a *fresh-water* salmon from California with a Kamtschatkan salmon is very uncertain. In regard to the migratory salmon, however, the case is different.

5. SALVELINUS SPECTABILIS (Girard) Gill & Jordan.

Pacific Red-spotted Trout.

1856—*Salmo spectabilis* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 218, (not *Salar spectabilis* Valenciennes).

Salmo spectabilis GIRARD, Pac. R. R. Expl. Fishes, p. 307, 1858.

Salmo spectabilis SUCKLEY, Nat. Hist. Wash. Terr. p. 342, 1860.

Salvelinus spectabilis JORDAN, Man Vert. ed. 2d, p. 360, 1878.

Salvelinus spectabilis JORDAN, Cat. Fishes N. A. p. 430, 1878.

1861—*Salmo parkei* SUCKLEY, Ann. Lyc. Nat. Hist. N. Y. vii, p. 309.

Salmo parkii GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 121, 1867.

Salmo parkei SUCKLEY, Monograph Genus *Salmo*, p. 149, 1874.

Salmo parkii JORDAN & COPELAND, Check List, p. 144, 1876.

Salmo parkii HALLOCK, Sportsman's Gazetter, p. 347.

1861—*Salmo campbelli* SUCKLEY, Ann. Lyc. Nat. Hist. N. Y. p. 313, (substitute for *spectabilis*).

Salmo campbelli GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 148, 1867.

Salmo campbelli SUCKLEY, Monograph Genus *Salmo*, p. 118, 1874.

Salmo campbelli HALLOCK, Sportsman's Gazetter, p. 349.

The Charrs, or *Salvelini*, form a strongly marked group, which has several times been distinguished as generically or subgenerically different from the true Salmon. The absence of teeth on the shaft of the vomer has been the character most usually relied on to distinguish the Charrs. A more important character is, however, seen in the form of the bone, which is boat-shaped, with the shaft short and depressed. The Charrs are further distinguishable by the very small size of the scales, and also by the coloration, they being always red-spotted, and with the lower fins peculiarly colored.

No one who examines the skull of the Charr can doubt its generic distinctness from *Salmo*. The question of the nomenclature of the genus is a matter perhaps of some uncertainty. The group has long been known as *Salvelini*, but that name was hardly given by Nilsson in the usual generic or subgeneric sense, but merely as a plural noun referring to an assemblage of species.

In 1836, Richardson used the name *Salvelinus* for the "subgenus" of Charrs. The use of the name in nomenclature therefore dates from Richardson.

In 1842, DeKay founded his genus *Baione* on the young of one of the species of Charr (*S. fontinalis*); *Baione* is therefore a synonym of *Salvelinus*, although given under a different supposition.

Somewhat later, the genus *Umbla* was proposed by Rapp for those *Salvelini* which have teeth on the hyoid bone. As *Salmo salvelinus* L., the presumable type of *Salvelinus*, has such teeth, *Umbla* probably is also a mere synonym of *Salvelinus*. That the character of hyoid teeth is not a generic one in this case is evident from the close relationship of such species as *S. quassa* and *S. spectabilis*, with hyoid teeth, with *S. fontinalis* and *S. bairdi*, species destitute of such teeth. The teeth in *S. spectabilis* and *S. quassa* are too few and small for their absence or presence to be a generic character. In the subgenus *Salar*, the case is precisely the same.

In 1867, Dr. Günther proposed a genus *Hucho* for the *Salvelini* without hyoid teeth. The genus cannot stand on that basis, but nevertheless it appears to be valid, its type, *Salmo hucho* L. (*Hucho germanorum* Günther), being a Pike-like fish, very unlike, both in form and habits, the genuine species of *Salvelinus*. The single known species of *Hucho* as thus restricted, inhabits the Danube.

The remaining subdivision of the old genus *Salmo*, for which the name *Cristivomer* has been proposed by Dr. Gill and myself, is peculiar to the lakes of the northern part of America.

The relations of *Cristivomer* are entirely with *Salvelinus*, a fact which has not hitherto been noticed. Its vomer differs, however, from that of *Salvelinus* in being provided with a raised crest flush with the head or chevron of the bone. This crest is posteriorly free from the vomer for some distance, and is armed with a series of stout teeth. There is also a strong band of hyoid teeth, the dentition generally being more complete than in most other Salmon.

The scales in *Cristivomer* are quite small, and the species are gray-spotted. There are probably but two species, *Cristivomer namaycush** (Walbaum) and *Cristivomer siscowet* (Agassiz).

The species of *Salvelinus* known within the limits of the United States are compared below. The species from British America, *Salvelinus stagnalis* (Fabricius) (= *S. nitidus* and *S. alipes* Rich.), *S. rossi* Rich., *S. hoodi* Rich., *S. lordi* Günther, *S. arcturus* Günther, and *S. tudes* Cope, I have not seen. Most or all of them are probably valid. *Salvelinus bairdi*, of the Pacific coast, is very near *Salvelinus fontinalis*, and may be a variety of it; but never having seen it in life, I am not by any means prepared so to consider it.

Common characters :—River Salmon, not anadromous, with the vomer boat-shaped, somewhat carinate below; a few teeth on the posterior part of the chevron; none on the depressed shaft: scales very small, more or less imbedded in the skin, in 200–250 transverse series, those of the lateral line considerably enlarged: fins moderate, the last ray of the dorsal not lengthened, shorter than any of the other developed rays; caudal fin rather short, usually but little emarginate in the adult, forked in the young: sides of the body with round red spots; lower fins with a pale marginal band anteriorly, succeeded by a darker band; in sea-run specimens, these spots and other markings are often obliterated, and a more or less uniform silvery tint prevails: species not of the largest size, the sexual peculiarities not very strongly marked, the adult male usually with a fleshy projection at the tip of the lower jaw, which fits into a slight emargination of the upper jaw.

a. Hyoid bone provided with a median band of teeth.

b. Body elongate, slender, considerably compressed, the depth about .20 of the length of the body: caudal peduncle long and slender: head quite small, .21 of length of body; its upper surface flattish, .13½ of length, the interorbital space about .07: mouth quite small, the maxillary short and moderately broad, .08 of length, not extending to the posterior margin of the eye; mandible .12 of length; snout, .05: scales quite small, in about 230 transverse rows: caudal fin well forked; adipose fin rather small: coloration dark blue, the red spots confined to the sides of the body, round, smaller than the pupil: hyoid teeth numerous, small. Lakes of MaineOQUASSA.†

bb. Body stout, not greatly compressed, the back elevated, the depth .24 of the length: head large, stout, broad, and flattened above, about .28 of length, its upper surface .17 of length, the interorbital space .08: mouth large, the maxillary extending beyond the eye .11 of length; the mandible, .16; the snout, .07: hyoid bone with very few (3 or 4), rather strong teeth (sometimes deciduous): fins short, the caudal slightly forked; adipose fin unusually large, its length in adults nearly twice that of the eye: scales very small, in about 240 transverse rows: red spots on the sides quite large, about the size of the pupil: back covered with very distinct spots, similar to those on the sides, but rather smaller, the dorsal spots said to be cream-colored or greenish in life, rather than red. Streams west of the Sierra NevadaSPECTABILIS.

* Namaycush Salmon, Pennant.—*Salmo namaycush* Walbaum, 1792, = *Salmo namaycush* Bloch, 1801, = *Salmo pallidus* Rafinesque, 1817, = *Salmo amethystus* Mitchill, 1818, = *Salmo confinis* DeKay, = *Salmo symmetrica* Prescott, 1851, = *Salmo adarondacus* Norris, 1864, = *Salmo toma* Hamlin, 1863.

† *Salvelinus oquassa* (Girard) Gill & Jordan.—*Salmo oquassa*, Girard, 1854.

aa. Hyoid bone without teeth.

c. Body elongate, moderately compressed, not much elevated, the depth .23 of length: head large and long, notably so in the adult, nearly .30 of length, .22 to .25 in the young; top of head .14 to .18 of length; interorbital space broad, .07 to .08½ of length; snout rather conical and pointed, .09 of length, blunter in the young; mandible .22 of length in adult, .15 in young; eye small, nearly in a line with the axis of the body: scales very small, similar to those in the other species, in about 230 transverse rows: caudal fin little forked; adipose fin quite small, shorter than the eye; pectoral and ventral fins not elongate: red spots about the size of the pupil, confined to the sides of the body, the back being nearly plain. Rivers west of the Sierra Nevada.....BAIRD.*

cc. Body oblong or elongate, moderately compressed, not much elevated, the depth .20 to .30 of length: head large, but not very long, its length .21 to .24 of length, the top about .14, the rather broad interorbital space about .07: mouth large, the maxillary reaching more or less beyond the eye, about .10 of length: the mandible about .15: eye large, more or less above the line of the axis of the body: scales very small, in about 230 transverse rows: caudal fin slightly lunate in the adult, forked in the young; adipose fin small; pectoral and ventral fins not especially elongate: red spots on body chiefly confined to the sides, rather less than the size of the pupil; the back and vertical fins more or less barred or mottled; coloration often plain in sea-run individuals. Rivers from Little Tennessee in Georgia to Lake Superior and Hudson's Bay.

FONTINALIS.†

The original type of *S. spectabilis* and of *S. campbelli*, the latter being merely a substitute name, is still preserved in the National Museum. Although badly decayed, its identity with the species here called *spectabilis* is evident. The types of *Salmo parkei* are now lost, but that the species is the same as *S. spectabilis* seems unquestionable. The name *spectabilis* should now be retained for this fish, as the *spectabilis* of Valenciennes, being a *Salar*, belongs to a different genus.

6. GILA OREGONENSIS (Richardson) Jordan.

1836—*Cyprinus* (*Leuciscus*) *oregonensis* RICHARDSON, Fauna Bor.-Americana, iii, p. 305.

Leuciscus oregonensis DEKAY, New York Fauna, Fishes, p. 215, 1842.

Leuciscus oregonensis CUV. & VAL., Hist. Nat. des Poissons, xvii, p. 326, 1844.

Leuciscus oregonensis STORER, Synopsis Fishes N. A. p. 412, 1846.

Ptychocheilus oregonensis GIRARD, Proc. Ac. Nat. Sc. Phila. p. 209, 1856.

Ptychocheilus oregonensis GIRARD, Pac. R. R. Expl. Fishes, p. 298, pl. 64, figs. 5-9, 1858.

Leuciscus oregonensis GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 239, 1868.

Ptychocheilus oregonensis JORDAN & COPELAND, Check List of Fishes, p. 151, 1876.

Gila oregonensis JORDAN, Catalogue Fishes N. A. p. 424, 1878.

1855—*Ptychocheilus gracilis* AGASSIZ, Am. Journ. Sci. Arts, xix, p. 229.

Specimens from the Clackamas River agree in all essential respects with the descriptions given by Agassiz, Girard, and Günther. The

* *Salvelinus bairdi* (Suckley) Gill & Jordan.—*Salmo bairdii*, Suckley, 1861.

† *Salvelinus fontinalis* (Mitchill) Gill & Jordan.—*Salmo fontinalis*, Mitchill, 1814.—*Salmo allegheniensis*, Rafinesque, 1820.—*Salmo nigrescens*, Rafinesque, 1820.—? *Salmo hearnii*, Rich., 182.—*Salmo canadensis*, H. Smith, 1834.—*Salmo erythrogaster*, DeKay, 1842.—*Baione fontinalis*, D. Kay, 1842.—*Salmo immaculatus*, H. R. Storer, 1850.—*Salmo hudsonicus*, Suckley, 1861. The names *immaculatus* and *canadensis* were given to the Canadian Salmon-Trout, which is a Brook-Trout run into the sea.

teeth are 2, 4-5, 2, not 2, 5-5, 2, and the folding of the lips, which suggested the name *Ptychochilus*, is not an evident feature to me.

This species, which is the type of the genus *Ptychochilus*, is a true species of the genus *Gila* as the characters of that genus are now understood. The general physiognomy is similar, the head is long, slender, and depressed, the mouth is very large and overlapped by the snout, the caudal peduncle is slender; the scales are similarly small and loosely imbricated, the dorsal fin is slightly behind the ventrals, the anal fin is not elongate; the lips are normal; the pharyngeal teeth are two-rowed, the inner row 5-4 or 5-5, and the intestinal canal is short. In all these respects, the type of *Ptychochilus* agrees with the type of *Gila*, and as no generic difference has been shown, *Ptychochilus* becomes a synonym of *Gila*. At present, the fishes called *Clinostomus* by Girard are referred to *Gila*. The two groups ought to be generically distinguishable. The typical species of each are very different in physiognomy, but at present, as has been shown by Professor Cope, we are unable to draw a line between them.

The other species referred to *Ptychochilus* are probably distinct from *oregonensis*, but should be compared with species of *Gila* and with each other. If *rapax* and *lucius* have really the teeth 2, 4-4, 2, it may be necessary to frame a separate genus for them, as they would hardly be referable to *Notropis* or to *Gila*.

7. ACROCHILUS ALUTACEUS Agassiz & Pickering.

Hard-Mouths.

1855.—*Aerocheilus alutaceus* AGASSIZ & PICKERING, Amer. Jour. Sci. Arts, xix, p. 96.

Lavinia alutacea GIRARD, Proc. Ac. Nat. Sc. Phila. 1856, p. 184.

Acrochilus alutaceus GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 276, 1868.

Acrochilus alutaceus JORDAN & COPELAND, Check List Fishes, p. 146, 1876.

Acrochilus alutaceus JORDAN, Catalogue Fishes N. A. p. 418, 1878.

Several fine specimens of this very interesting species are in Mr. Stone's collection. As no detailed account has been given of the fish, and as none of the authors mentioned in the above synonymy, excepting Professor Agassiz, seem ever to have seen it, I give a description of one of the specimens. The relations of this genus are doubtless with *Chondrostoma*, but its teeth are fewer and differently formed.

General form and appearance of the species of *Gila*, but the head not depressed, and more blunt forward.

Body elongate, not much compressed, its sides more so than the caudal peduncle; the greatest depth, over the ventrals, 4 in length; caudal peduncle very long and very slender, unusually broad, nearly terete, its length contained $4\frac{2}{3}$ times in the length of the body, its least depth $2\frac{2}{3}$ in length.

Head moderate, $4\frac{1}{4}$ in length of body, bluntish, the profile considerably rounded, the interorbital space strongly convex. Mouth horizontal,

subinferior, overlapped by the broad, blunt snout, its breadth considerable, but the maxillary not extending far back, not to opposite the front of the eye. Upper jaw protractile, covered with a fleshy lip, inside of which is a small, straight, cartilaginous plate, similar to that on the lower jaw, but much smaller and not evident externally. Lower lip covered with a firm cartilaginous plate, sharp externally, the upper surface being formed by its bevelled edge. The transverse width of this plate is between four and five times its (longitudinal) breadth. The plate extends in nearly a straight line from one angle of the mouth to the other; its transverse width is contained $2\frac{3}{4}$ times in the length of the head. Eye rather large, $5\frac{1}{2}$ in head, $1\frac{3}{8}$ in snout, its position anterior and not high up, $2\frac{1}{4}$ in interorbital space.

Fin-rays: Dorsal I, 10. Ventrals, 9. Anal I, 9. Dorsal long, rather low, its first ray just behind the first ray of ventrals, about over the middle of the latter fin, midway between the snout and the middle of the base of the caudal fin; caudal fin very long, the lobes about equal, longer than the head, widely forked, the accessory rays at its base very numerous and recurrent on the caudal peduncle; about eight of these may be distinguished on each side of the fin. Anal fin rather large; ventrals broad, not reaching vent. Pectorals moderate, not reaching two-thirds of the distance to the ventrals.

Scales quite small, somewhat imbedded in the skin, very loosely imbricated, or often scarcely imbricated at all, the exposed surfaces longer than high, profusely punctate; squamation quite irregular; the scales smaller on back and belly than on sides, most exposed on caudal peduncle. Scales 21-85-13. Lateral line broadly decurved.

Coloration very dark, belly paler, but nearly all parts of the body studded with minute dark points.

Teeth 5-4 (5 on the left side, 4 on the right), hooked, somewhat club-shaped, with a broad masticatory surface.

Peritoneum black; intestines much elongate, filled in this specimen with vegetable substance, apparently fine leaves and branches of a *Sphagnum*-like moss.

Length of specimen examined, one foot.

8. MYLOCHILUS CAURINUS (Richardson) Girard.

1836—*Cyprinus* (*Leuciscus*) *caurinus* RICHARDSON, Fauna Boreali-Americana, iii, p. 304.

Leuciscus caurinus DEKAY, Zoology N. Y. Fishes, p. 215, 1842.

Leuciscus caurinus CUVIER & VALENCIENNES, Hist. Nat. des Poissons, xvii, p. 325, 1844.

Leuciscus caurinus STORER, Synopsis Fishes N. Am. p. 159, 1846.

Mylocheilus caurinus GIRARD, Proc. Acad. Nat. Sci. Phila. p. 169, 1856.

Mylocheilus caurinus GIRARD, Pac. R. R. Expl. x, p. 213, pl. 46, f. 1-4, 1858.

Leucosomus caurinus GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 270, 1868.

Mylochilus caurinus JORDAN & COPELAND, Bull. Buffalo Soc. Nat. Hist. p. 155, 1876, (name only).

Mylochilus caurinus JORDAN, Catalogue Fishes, p. 427, 1878.

1855—*Mylocheilus lateralis*, AGASSIZ, Am. Journ. Sci. and Arts, p. 231.

Mylocheilus lateralis GIRARD, Proc. Acad. Nat. Sci. Phila. p. 169, 1856.

Mylocheilus lateralis GIRARD, Pac. R. R. Expl. p. 213, pl. 48, f. 5-8, 1858.

Mylocheilus lateralis JORDAN & COPELAND, Bull. Buffalo Soc. Nat. Hist. p. 155, 1876.

1856—*Mylocheilus fraterculus* GIRARD, Proc. Acad. Nat. Sci. Phila. p. 169.

Mylocheilus fraterculus GIRARD, Pac. R. R. Expl. x, p. 215, pl. 45, f. 1-4, 1858.

Mylocheilus fraterculus COOPER, Nat. Wealth Cal. by Cronise, p. 496, 1868.

Mylocheilus fraterculus JORDAN & COPELAND, Bull. Buffalo Soc. Nat. Hist. p. 155, 1876, (name only).

Habitat.—Northern California to British Columbia.

My specimens agree perfectly with Dr. Günther's description of his *Leucosomus caurinus*, which was taken in part from Richardson's original types, except that the size of the eye in my fishes is proportionally larger. Agassiz's account of *Mylocheilus lateralis* answers in a general way, except that I find no trace of anything which can be called a horny sheath on the jaws. There is nothing in Girard's trivial description of *Mylocheilus fraterculus* to indicate distinction. I therefore follow Dr. Günther in considering *M. lateralis* and *M. fraterculus* as mere synonyms of *M. caurinus*. The genus *Mylocheilus* resembles in form, squamation, etc., the genus *Gila*. It has, however, a much smaller mouth than most of the species of that genus. Its relations are rather with *Pogonichthys* and *Platygobio*, from both of which it differs in the peculiar form of its teeth as well as in the number of teeth. I find in the specimen before me the teeth 2, 5-5, 2, the teeth of the smaller row quite small and close together, and the innermost of the larger row much enlarged and truncate, gradually diminishing in size to the uppermost, which is slender, compressed, and hooked. I find no trace of a third row in my specimens.

The genus *Mylopharodon* Ayres is perfectly distinct from *Mylocheilus*, the upper jaw being non-protractile, the dorsal behind the ventrals, and no barbel at the angle of the maxillary. *Mylopharodon* thus far apparently contains but a single species, the types of *Gila conocephala* B. & G. and *Mylopharodon robustus* Ayres being, so far as I can see, conspecific.

A REVIEW OF THE AMERICAN SPECIES OF THE GENUS SCOPS. SAVIGNY.

By ROBERT RIDGWAY.

Previous to the publication, some two years since, of Mr. R. B. Sharpe's admirable work on the *Strigida*,* I had paid considerable attention to the study of the American Scops-owls, but the lack of sufficient material prevented my reaching any very positive conclusion as to several forms of questioned validity. More recently, however, through the assistance of several friends, among whom I may name in particular Mr. Osbert

* Catalogue of the Striges, or Nocturnal Birds of Prey, in the Collection of the British Museum. By R. Bowdler Sharpe. London: Printed by order of the Trustees. 1875.

Salvin, of England, and Mr. George N. Lawrence, of New York City (both of whom have kindly loaned me their entire series), I have been enabled to bring together a collection amply sufficient to settle former doubts.

The inference derived from a careful study of the material first in hand was, that a greater number of species existed than were usually recognized as valid; certain forms allied to *S. brasiliannus* (Gmel.), named, but generally considered synonymous with some other species, being represented by typical specimens, while there were no examples of intermediate character, the differences between these several styles being moreover so obvious that it seemed scarcely possible they could intergrade. I was therefore quite convinced that additional material would confirm the view of their distinctness. Being thus prejudiced, as it were, in my views of the relationship of the several forms alluded to, I at first attempted to divide the new series accordingly. Determined and repeated efforts failed, however, until I fully realized the utter hopelessness of the attempt. Thus I was irresistibly, though quite against my previous convictions, led to the same conclusion as that reached by Messrs. Sclater and Salvin, and subsequently adopted by Mr. Sharpe, that the several supposed species allied to *S. brasiliannus* are merely geographical, local, and individual variations of the same species. No other view seems justifiable, in view of the complete and unquestionable intergradation between the most extreme variations. The only alternative is to allow a very much greater number of forms even than have been named, admitting at the same time the intergradation of each with the other.

It has been remarked by an eminent author* that few, if any, birds vary more in their feral state, both individually and otherwise, than the owls, and that of all the genera of this family the present one is the most variable. In this opinion I fully agree, for I have rarely had a more difficult and, I may say, more unsuccessful task than my attempt to elucidate the several species and "races" treated in the present memoir.

In the first place, the plumage is characterized by confused markings in the form of zigzags, "herring-bone" *pictura*, and minute vermiculations, having much the same general character in all, the difference between the several species in the pattern of coloration being exceedingly difficult of description. Next, there is the perplexing condition of "dichromatism", the same species having two very distinct phases of plumage—a gray phase, which may be considered the normal dress, and a rufous phase, which is an extreme development of the variation called "erythrism". These two extreme phases, which it is to be remembered do not depend at all upon age, sex, or season, being purely an individual peculiarity, are in each species so very unlike that corresponding phases of the several really distinct species resemble one

* Sharpe, *l. c.*, p. 44.

another very much more closely than do the two extreme phases of any one species! The geographical variations are also unusually pronounced, while last, but by no means least of the obstacles presented, is the very great range of individual variation within even a limited area of country.

Genus SCOPS, Savigny.

- = *Scops*, SAVIGNY, Descr. de l'Égypte, 1809, 291 (type, *Strix scops*, Linn.).—CASS., in Baird, B. N. Am. 1858, 51.—COUES, Key, 1872, 202.—B. B. & R., Hist. N. Am. B. iii, 1874, 47.—< SHARPE, Cat. Strig. Brit. Mus. 1875, 43 (includes *Lophostrix*, Less.).
- = *Ephialtes*, KEYS. & BLAS., Wirb. Eur. 1840, p. xxxiii (type, *Strix scops*, Linn.—*Neoschrank*, 1802).
- ? *Pisorhina*, KAUP, Isis, 1848, 769 (type, *Scops menadensis*, Quoy & Gaim.).
- = *Megascops*, KAUP, l. c. (type, *Strix lempiji*, Horsf.).
- ? *Aenemis*, KAUP, l. c. (type, *Scops gymnopus*, Gray).
- ? *Ptilopsis*, KAUP, l. c. (type, *Strix leucotis*, Temm.).
- = *Lempijius*, BONAP., Rev. et Mag. de Zool. 1854, 542 (type, *Otus semitorques*, Schleg.).

Generic Characters.—Small owls with distinct ear-tufts, the tarsus more or less feathered (usually completely feathered), the wings ample (more than twice the length of the short, slightly rounded tail), the plumage exceedingly variegated with vermiculations, cross-bars, and mottlings; toes naked or bristled—never completely feathered, except toward the base.

The above brief diagnosis is sufficient to characterize this group. In general aspect the species of this genus are miniatures of those which belong to the genus *Bubo*, and are perhaps as nearly related structurally to the latter as to any other members of the family.

All the American species have the outer webs of the scapulars mostly light-colored (generally white, with a blackish terminal border—rusty-ochraceous in *flammeolus* and the darker forms of *brasilianus*), producing a more or less distinct stripe along each side of the dorsal region; the feathers of the upper and lower parts usually with blackish shaft-streaks, those beneath generally with narrow transverse bars; outer webs of the remiges with light-colored spots, and the tail more or less distinctly (never sharply) banded. All the species are, in some part of their range, dichromatic, having a bright rufous phase, quite different from the "normal" grayish plumage.

Key to the Species.

- A.—Toes and lower half (or more) of tarsus completely naked ... 1. *S. nudipes*.
- B.—Toes alone (or with merely lower end of tarsus) completely naked 2. *S. brasilianus*.
- 3. *S. barbarus*.
- 4. *S. flammeolus*.
- C.—Toes strongly bristled, sometimes densely feathered at base ... 5. *S. asio*.
- 6. *S. cooperi*.

By the above characters, the American species of this genus are readily divided into three groups. It now remains to distinguish

between the species of each group, which is a much more difficult matter. Passing by group A., which contains only *S. nudipes*, the three species belonging to group B. may be distinguished as follows:—

- a.—Toes stout, with strong claws. Wing exceeding 5.75 inches (rarely less than 6.00, and ranging to nearly 8.00 inches); tail more than 3.15 2. *S. brasiliensis*.
- b.—Toes weak and slender, with weak claws. Wing less than 5.75 inches (ranging in length from 5.10 to 5.60); tail less than 3.15 (2.60–3.10).
- Feathers of the outer margin of the face with their shafts produced into slender, soft, hair-like, curved bristles, forming a conspicuous ruff, the anterior side concave. Plumage coarsely spotted, above and below 3. *S. barbarus*.
- Feathers of the outer margin of the face with their shafts not conspicuously developed. Plumage finely vermiculated, above and below, the outer scapulars having orange-buff spots on the outer webs 4. *S. flammeolus*.

The above brief diagnoses are probably sufficient to distinguish these three very distinct species in all their numerous variations. The differences are very much more easily perceived than defined, the birds having an entirely different aspect when compared with one another. Of the three, *S. brasiliensis* varies almost indefinitely, but may always be known by its much stouter toes and stronger claws, as well as by its larger size, even in the smallest race (*S. cassini*), although the difference in dimensions is sometimes so slight as to be perceptible only by actual measurement. *S. barbarus* is distinguished by the coarseness of its markings, which partake of the character of roundish or transversely-oblong spots, rather than fine vermiculations, and by the peculiar development of the shafts of the facial feathers. *S. flammeolus* is slightly smaller than *S. barbarus*, and of quite different build, having an extremely light and slender body, with small head, the wings thus seeming very long in proportion. As to colors, it may ordinarily be distinguished from all the other species by the pronounced orange-buff tint of the outer webs of the outer row of scapulars, these being in most others white, or, if not white, of a more sombre shade of buff and fulvous, the plumage being otherwise quite different. According to Mrs. M. A. Maxwell, who has in her finely-mounted collection of Colorado birds a very beautiful specimen, the iris of this species is of a deep hazel, or umber-brown; should this prove constant, it will afford an excellent character, since the iris in nearly if not all the other species is known to be a bright lemon-, or gamboge-, yellow.

A.—Lower half or more of the tarsus completely naked, like the toes.

1. SCOPS NUDIPES.

Bubo nudipes, VIEILL., Ois. Am. Sept. 1807, pl. 22.

Scops nudipes, CUV., Règ. Anim. 1829, 347.—STRICKL., Orn. Syn. I, 1855, 203.—LAWR., Ann. Lyc. N. Y. IX, 1868, 132 (*Costa Rica*).—SALVIN, P. Z. S. 1870, 216 (*Veragua*).—SCL. & SALV., Nom. Neotr. 1873, 117 (*Costa Rica to Columbia*).—SHARPE, Cat. Strig. Brit. Mus. 1875, 121 (*Veragua; Costa Rica*).—BOUC., Cat. Av. 1876, 91 (*Veragua*).

Ephialites nudipes, GRAY, Genera B. I, 1844, 38.

Aenemis nudipes, BONAP., Rev. et Mag. de Zool. 1854, 542.

Strix psilopoda, VIEILL., Nouv. Dict. XVI, 1817, 46.

Hab.—Costa Rica and Veragua.

DIAGNOSIS.—“*Adult.* Above sandy rufous, vermiculated with black, much darker on the back than on the head, the dorsal feathers black in the centre, barred and spotted with sandy rufous, these bars more distinct on the scapulars, the outermost of which are silvery white, externally tipped with black; wing-coverts decidedly darker than the back, the innermost of the least series uniform blackish brown, the rest spotted and barred with sandy rufous, the bars especially broad on the greater series, some of which have a tolerably large buffy white spot near the tip of the outer web; spurious quills externally notched with sandy rufous, inclining here and there to whitish; primary coverts nearly uniform blackish brown, with a few bars of sandy rufous near the tips of the outer webs; quills blackish brown, the inner webs of the primaries quite uniform, excepting for a few yellowish bars near the bases of the interior feathers, the secondaries indistinctly barred with ashy brown on the inner webs, all the quills externally barred with sandy rufous, paler and more fulvous on the outer web of the primaries, the innermost secondaries mottled and barred with sandy rufous, and resembling the scapulars; tail blackish brown, with seven feebly indicated narrow bars of sandy rufous; head and neck decidedly clearer than the back, and somewhat inclining to chestnut, the feathers black in the centre, and laterally barred with the same, giving a generally barred appearance to these parts; lores and sides of face bright bay, the loreal plumes blackish at tip, and the ear-coverts with a few indistinct cross bars of black; over the eye a few white-barred feathers, forming a faint eyebrow; ear-tufts lighter than the crown, orange rufous, broadly barred with black at the tips; under surface of body sandy rufous, many of the feathers coarsely vermiculated with black, the breast-feathers streaked and laterally barred with black, these black markings less distinct on the flanks and abdomen, on which parts are tolerably distinct bars of white; leg-feathers bright orange-rufous, with a few narrow brown bars on the tibia; under tail-coverts white, barred across with sandy rufous; under wing-coverts fulvous, thickly mottled with brown near the outer edge of the wing, which is white, the lower series dark brown, like the inner lining of the quills; bill yellowish;

feet yellowish, claws horn-colour. Total length 10 inches, wing 6·8, tail 4·1, tarsus 1·55, bare part of latter 0·85. (*Mus. Salvin and Godman.*)

"*Obs.* My description is taken from a specimen obtained at Calobre, in Veragua, by Arcé, and kindly lent to me by Mr. Salvin. He has at the same time lent me another specimen, obtained by the same collector in Costa Rica. This latter bird differs in several points from the one described, having more of the general aspect of *Scops pennatus* of the Himalayas; it is clear sandy in colour, the black forming regular bars across the plumage, the subterminal one very broad, and giving the appearance of large black spots to the upper surface; feathers of the crown centred with black, the sandy-colored interspaces forming very distinct spots, the ear-tufts being still lighter, and barred across with whitish; the white spots on the scapulars, wing-coverts, and outer webs of primaries very distinct, as are also the white bars on the lower surface, many of them being apparent also on the chest-feathers; the quills barred with ashy brown on their inner webs, inclining to sandy buff on the secondaries. Total length 9·5 inches, wing 6·8, tail 4, tarsus 1·45, bare part of the latter 0·65."

The only specimens of this species which I have seen are several borrowed from Mr. Salvin, and returned to him without descriptions having been taken from them. I therefore quote Mr. Sharpe's account of the species (*l. c.*).

B.—*Toes only, or with, at most, the extreme lower portion of the tarsus, completely naked.*

2. SCOPS BRASILIANUS.

a. brasilianus.

Strix brasiliانا, GMEL., S. N. I, i, 1788, 289 (ex Briss., I, 499).

Strix choliba, VIEILL., NOUV. DIET. xiv, 1817, 39 (ex Azara, Apunt. II, 218).

Strix decussata, LICHT., VERZ. DOUBL. 1823, 59.

Strix crucigera, SPIX, AV. BRAS. I, 1825, 22, pl. 9.

Strix undulata, SPIX, *l. c.* pl. 10.

? *Scops lophotes*, LESS., TRAITÉ, I, 1831, 107.

Ephialites argentina, LICHT., NOMENCL. 1854, 7.

β. atricapillus.

Strix atricapilla, "NATT.", TEMM., PL. COL. II, 1838, pl. 145.

Ephialites watsoni, CASSIN, PR. PHILA. ACAD. IV, 1849, 123.

γ. ustus.

Scops usta, SCL., P. Z. S. March 9, 1858, 132.

δ. guatemalæ.

Scops brasilianus, subsp. *β. Scops guatemalæ*, SHARPE, CAT. STRIGES BRIT. MUS. 1875, 112, pl. ix.

ε. cassini.

Scops brasilianus, *ε. cassini*, RIDGW., MS.

The above synonymy will serve to show what names I would bring together under the specific head of *Scops brasilianus* (Gmel.) on account

of the complete intergradation of the forms which they designate; it will also indicate the number and names of the more pronounced races I have been able to make out, arranged in chronological sequence, the full synonymy of each being given separately further on.

There are now before me 44 specimens of Scops-owls from Tropical America, different specifically from *S. barbarus*, *S. flammeolus*, and *S. nudipes*, and also very distinct from the hairy-toed members of the genus. This series appears, at first sight, to be made up of several distinct species, there being no less than six very pronounced types of coloration represented; these different styles being so exceedingly different in appearance that in the absence of intermediate specimens no one would hesitate to recognize their specific distinctness.

These different styles are more or less characteristic of separate geographical areas; thus, the "*brasiliannus*" type prevails over Eastern South America, "*ustus*" in Upper Amazonia and in Columbia, "*guatemala*" in Central America, and "*cassini*" in Eastern Mexico. They thus partake somewhat of the nature of geographical races; were they strictly such, the case would be very much simplified; but such, unfortunately, is not the case, since it frequently occurs that extreme specimens of one form may be found in a region of which it is not typical, while several, if not all, of them may be represented in a sufficiently extensive series from a single district! Thus, we have true "*guatemala*" from Bahia, Brazil; pure *brasiliannus* from Costa Rica and Guatemala; and a specimen apparently very much like "*ustus*" from Sta. Catarina, S. E. Brazil.

In the absence of specimens of neutral or intermediate character, these facts would not be antagonistic to the theory of specific distinctness of the forms named above, but, on the contrary, would be decidedly confirmative, since they would do away with the probability that the variations are purely the result of geographical impress. Generalized specimens, however, or those which are not typical of either one or the other of the several races, constitute a very large proportion of the whole.*

It is in consideration of all these facts that we are led to conclude that the several particular forms we have named above, however distinct they may appear when the most specialized examples are compared, are but "strains" of a single species, tending toward the establishment of permanent geographical races (and in the course of time distinct species), but which, in consequence of the non-extinction of specimens of a generalized nature, have not yet passed the incipient stage.

The variations in this species involve not only differences in the colors themselves, but in the character and distribution of the markings, scarcely two examples being exactly alike. Variations of a purely

*A specimen from Mazatlan, Western Mexico, in the gray phase, is so exactly intermediate between *guatemala* and *brasiliannus* that it cannot be referred more properly to one than to the other.

individual nature, however, are best treated under the head of each particular race.

a. brasiliensis.

Le Hibou de Brésil, BRISS., Orn. I, 1766, 499 (*Brazil*; = rufous phase, with feathers of lower surface distinctly rufous below the surface, and sharply barred).

Strix brasiliensis, Gmel., S. N. I, i, 1788, 289 (ex Briss., *l. c.*).

Scops brasiliensis, GRAY, Handl. I, 1869, 47 (part).—SCL. & SALV., P. Z. S. 1868, 629 (*Venezuela*); 1870, 782 (*Merida, Venezuela*); 1873, 304 (*E. Peru*); Nom. Neotr. 1873, 117 (part).—SHAPE, Cat. Strig. Brit. Mus. 1875, 108 (*Bahia; Para; Island of Meriana; Upper Amazons; Cayenne; Trinidad; Caracas; Antioquia; Columbia*).—FINSCH, P. Z. S. 1870, 557 (*Trinidad*).—BOUC., Cat. Av. 1876, 91.

Ephialtes brasiliensis, GRAY, Genera B. I, 1844, 35.

Otus brasiliensis, TEMM. & SCHLEG., Fauna Jap. 1845, 25.

Scops brasiliensis, BONAP., Consp. I, 1850, 46.—KAUP, Contr. Orn. 1852, 112.—SCHLEG., Mus. P.-B. Oti, 1862, 21; Rev. Acc. 1873, 11.

Megascops brasiliensis, KAUP, *t. c.* 228.

Asio brasiliensis, BONAP., Rev. et Mag. de Zool. 1854, 543.

Choliba, AZARA, Apunt. II, 1802-05, 218.

Strix choliba, VIEILL., Nouv. Dict. XVI. 1817, 39 (ex Azara, *l. c.*), (= "*brasiliensis*" style, with feathers of lower parts distinctly orange-rufous below surface, etc.).

Ephialtes choliba, GRAY, Genera B. I, 1844, 38.—PELZ., Orn. Bras. 1870, 9.

Scops choliba, D'ORB., Voy. Ois. 1835-44, 132.—TSCHEDI, Fauna Per. 1844, 118.—STRICKL., Orn. Syn. I, 1855, 204.—LAWR., Ann. Lyc. N. Y. VII, 1862, 462 (*New Granada*).—SCL. & SALV., P. Z. S. 1866, 198.

Strix decussata, LICHT., Verz. Doubl. 1823, 59.

Scops decussata, BURM., Th. Bras. II, 1856, 126 (*grayish phase*).

Strix crucigera, SMX, Av. Bras. I, 1824, 22, pl. 9.

Strix undulata, SMX, *t. c.* pl. 10.

Ephialtes argentina, LICHT., Nom. 1854, 7.—SCHLEG., Mus. P.-B. Oti, 1862, 21.

Scops argentina, GRAY, Handl. I, 1869, 47.

? *Scops lophotes*, LESS., Traité, I, 1831, 107.†—PUCHERAN, Rev. et Mag. de Zool. 1849, 22

* "One specimen, agreeing with Brazilian specimens."

† "Tout le dessus du corps brun foncé, ponctué de roux, mais par points très-ténus, très-rapprochés et très-nombreux. Les dessous du corps roux, flammé de noir, formant une masse brune sur la poitrine; les hanches élargies à la base. Patrie inconnue.

"*Observ.* On doit ajouter à ce sous-genre le HIBOU CHAPERONNÉ, *Strix atricapilla*, Temm., pl. 145, du Brésil, et le HIBOU NOCTULE, *Strix noctula*, Reinw., Temm., pl. 99, de Java et de Sumatra, qui est peut-être l'espèce 25, décrite sous le nom de *Scops de Java*." [Lesson, *l. c.*]

From the description alone, as quoted above, it is absolutely impossible to decide to which of the races of *S. brasiliensis* this reference belongs. It is quite as likely to be a synonym of the form we distinguish as *atricapillus*, Temm. (see p. 95). Sclater and Salvin (Ex. Orn. VII, 1868, p. 102), who have seen Lesson's type, say that it is "probably only a paler form" of *S. brasiliensis*. Another name, usually referred to *S. brasiliensis*, but which we are in doubt about, is *Scops portoricensis*, Less. (Traité, I, 1831, 107.—"*Scops de Porto Rico*"). We have never seen a specimen of this genus from any of the West India islands, but think it quite likely that peculiar races exist there. Of this bird also, Messrs. Sclater and Salvin "have seen the type-specimens, . . . in the Paris Museum, and have been unable to distinguish it from *S. brasiliensis*." We quote below Lesson's description in full:—

"D'un gris-roux glacé, strié en long de flammèches roux-brun, plus finement strié en travers; deux hanches élargies et triangulaires sur les côtés de la tête; taille un peu plus forte, et teinte beaucoup plus blonde que l'espèce d'Europe. Habite l'île de Porto-Rico. (Mus. de Paris, Mauge.)"

(critical).—BONAP., *Consp.* I, 1850, 46.—STRICKL., *Orn. Syn.* I, 1855, 204.—
SCL. & SALV., *Ex. Orn.* 1868, 102 (in text).—GRAY, *Hand-l.* I, 1869, 47.

Asio lophotes, BONAP., *Rev. et Mag. de Zool.* 1854, 543.

? *Scops portoricensis*, LESS., *Traité*, I, 1831, 107.—Pucheran, *Rev. et Mag. Zool.* 1849, 26
(critical).

"*Ephialites portoricensis*", LÉOT., *Ois. Trinidad*, 1866, 57.

REMARKS.—This style, which prevails over Eastern South America (Brazil, Paraguay, and Buenos Ayres), is characterized mainly by the very sharp definition of the cross-bars on the lower parts, these being usually nearly pure black upon an almost pure white ground, and by the very distinctly orange-rufous bases of the feathers, this color showing conspicuously on the lower surface wherever the plumage is disarranged.

Thirty specimens are before me, the localities represented being the following:—Brazil (13), Paraguay (1), Buenos Ayres (1), Ecuador (Napo 1), Columbia (Antioquia 2, Bogota 2), Costa Rica (9), and Guatemala (1.) Six specimens from Costa Rica, collected by Mr. J. C. Zeledon, are almost undistinguishable from one another; the uniformity of their characters being indeed remarkable for this species. Two others which greatly resemble each other are one from Bogota, in Salvin and Godman's collection, and one in my own collection (No. 2270) from Guatemala. These are almost exactly alike; they have the upper parts of a dark grayish-brown color, very minutely and densely vermiculated with blackish, further relieved by occasional, inconspicuous lighter frecklings, and rather indistinct blackish mesial streaks, most obvious on the pileum; the feathers of the lower surface are distinctly bright buff below the surface, while the blackish markings—both the transverse and the longitudinal ones—are sharply defined and very distinct. In their general aspect, these specimens agree very nearly with typical examples of the "*brasiliensis*" style, but are darker in their general coloring above, where the mottlings are finer and denser.

A typical specimen of the style is No. 16431 (Nat. Mus.), from Paraguay. This has the lower plumage exactly like the two specimens described above, but the upper parts are lighter and more grayish, with the blackish mesial streaks in stronger relief. The Costa Rica specimens alluded to above greatly resemble this one, but are rather paler and more grayish. An extreme example is No. 12400 (Nat. Mus.), from Buenos Ayres. This has the lower parts as described above, except that the orange-buff of the basal portion of the feathers is brighter, and the black mesial streaks broader. The upper parts are light tawny, or sandy clay-color (not rufous), with very minute and inconspicuous transverse vermiculations, the black mesial streaks broad and conspicuous, especially on the pileum, where they form continuous stripes, while on the dorsal region they each have one or two expansions, so as to form a bead-like series. Quite similar to this, but darker above and with narrower streaks beneath, is a male in Salvin and Godman's collection from Antioquia, Columbia.

The most aberrant of the South American specimens before me is an example from Sta. Catarina, S. E. Brazil (Mus. Salvin and Godman). This has the upper plumage much as in the specimen last described, but the outer webs of the scapulars are bright buff, instead of white, and the pileum is suffused with blackish, the streaks of this color being thus rendered less distinct. It is the lower parts, however, which differ most: there is an entire absence of the usual sharply-defined, transverse, blackish markings, but in their stead exceedingly irregular and ragged markings of rusty rufous, into which the very obvious but ill-defined broad mesial streaks gradually blend; the whole pectoral region, the throat, and the face have a uniform rusty-buff ground-color, relieved by few markings. This individual apparently approaches the form named by Selater *S. ustus*.

Besides the above variations, there is another, involving the intensity of the buff on the basal portion of the feathers of the lower parts; in many, this is so bright as to show conspicuously wherever the feathers are the least bit disarranged, while in others only the merest trace of it can be discovered by careful search. Between all these variations, however, there is every possible intermediate condition in different individuals.

Mr. Sharpe (*l. c.*) remarks that this race does not assume the bright rufous phase so common in the form named *guatemalæ*. I have seen, however, a specimen from Bahia, an adult female, which is as brightly rufous as any specimen of *guatemalæ*, or, for that matter, even *S. asio*. The upper parts are deep brick-rufous, all the feathers with blackish shaft-streaks, these broadest on the pileum and back; the upper tail-coverts and the sides of the neck only are without these streaks. The outer webs of the exterior row of scapulars are pure white; the feathers of the dorsal region show fulvous transverse spots on the basal portion, mostly concealed, except where the feathers are disturbed, and larger across the nape than elsewhere. Each feather of the sides, flanks, and abdomen has a mesial streak of blackish-brown (with here and there a slight external suffusion of paler and more rusty-brown), which color expands into two rather wide, transverse, externally pointed spots on the basal half of the feather,—the terminal half having two or three narrow, finely zigzag, transverse lines of dark brown, here and there mixed with rufous,—making an average number of four bars on each feather, of which the two anterior are wider and more rufous.

This specimen resembles the rufous phase of "*cassini*" very much more than that of "*guatemalæ*", but is very much larger in all its dimensions.

A young bird, from Costa Rica, in the collection of Messrs. Salvin and Godman, differs from the adult as follows: ground-color light-buff, deepest above, relieved by narrow transverse bars of dusky, equally distinct above and below.

*List of Specimens Examined.**

Museum No.	Museum.	Sex.	Locality.	Date.	Wing.	Tail.	Culmen.	Tarsus.	Middle toe.
12400	U. S.	r.	Buenos Ayres		6.55	4.00	.58	1.10	.82
16431	U. S.	g.	Paraguay	June, 1859	6.55	4.00	.58	1.30	.90
16430	U. S.	g.	Brazil	Aug., 1859	6.40	4.15	.60	1.20	.85
—	S. & G.	juv. b.	do		7.00	4.30	.65	1.20	.90
—	S. & G.	— br.	do		6.65	4.20	.60	1.30	—
—	S. & G.	— gr.	Brazil (Bahia)		6.25	4.00	.57	1.20	.85
—	S. & G.	— gr.	do		6.20		.60	1.20	.90
—	S. & G.	— br.	do		6.00	3.80	.55	1.10	.85
—	S. & G.	ad. r.	Brazil (St. Catherine's)		7.90	5.20	.65	1.40	1.00
—	S. & G.	ad. b.	Brazil		6.90	4.40		1.28	.95
—	G. N. L.	ad. g.	do		6.60	4.00	.52	1.20	.85
—	G. N. L.	♂	Brazil (Bahia)		6.25	3.70	.52	1.05	.75
—	G. N. L.	r.	do		6.40	4.00	.52	1.20	—
50946	U. S.	juv. b.	Southern Brazil		7.50	4.90	.65	1.50	1.00
7805	M. C. Z.	ad. g.	Brazil (Pernambuco)		6.10	3.80	.60	1.15	.85
30966	U. S.	ad. r.	Ecuador (Napo)		6.80	4.30		1.30	.98
—	S. & G.	♂ r.	Columbia (Medellina)		7.00	4.20	.60	1.20	.98
—	S. & G.	♂ r.	do		7.50	4.60	.70	1.28	.98
—	S. & G.	ad. g.	Columbia (Bogota)		7.40	4.30	.60	1.15	1.00
—	G. N. L.	ad. g.	do		7.30	4.50	.55	1.25	.90
2270	R. R.	ad. g.	Guatemala		7.15	4.40	.65	1.20	.95
30416	U. S.	ad. g.	Costa Rica (San José)		7.00	4.10	.58	1.12	.90
67576	U. S.	juv. b.	Costa Rica						
67577	U. S.	juv. b.	do						

* In these tables, the initials in the column headed Museum stand for the following: "U. S.",—United States National Museum; "S. & G.",—Museum Salvin & Godman; "G. N. L.",—Museum of George N. Lawrence, esq.; "M. C. Z.",—Museum of Comparative Zoology, Cambridge, Mass.; "R. R.",—Museum of R. Ridgway. In the next column, the letters *g*, *r*, and *b* indicate the gray, rufus, and brown (or intermediate) phases respectively. The measurement of the culmen does not include the cere; the tail is measured to the extreme base of the coccyx, and the middle toe to the base of the claw.

3. atricapillus?

? *Strix atricapilla*, "NATT.", TEMM., Pl. Col. II, 1838, pl. 145.

Scops atricapilla, STEPHENS, Shaw's Gen. Zool. XIII, pt. 2, 1826, p. 51, pl. 39.—Cuv., Règ. Anim. ed. 2, 1829, 347.—BONAP., Cons. I, 1850, 46.—KAUP, Contr. Orn. 1852, 112.—STRICKL., Orn. Syn. I, 1855, 202.—BURM., Th. Bras. II, 1856, 128.

Ephialites atricapilla, GRAY, Genera B. I, 1844, 38, pl. 13, fig. 2 (head).—PELZ., Orn. Bras. 1870, 9 (?).

Megascops atricapilla, KAUP, Trans. Zool. Soc. Lond. IV, 1859, 228.

Asio atricapillus, BONAP., Rev. et Mag. de Zool. 1854, 543.

? *Ephialites watsoni*, CASS., Pr. Acad. Nat. Sci. Phila. IV, Dec. 1848, 123; Journ. Phila. Acad. II, 1852, 95, pl. xii, fig. 1.

Scops watsoni, BONAP., Cons. I, 1850, 46.—GRAY, Hand-l. I, 1869, 47.

Asio watsoni, BONAP., Rev. et Mag. de Zool. 1854, 543.

DIAGNOSIS.—*Adult male, gray phase* (Mus. O. S. & F. D. G., Engento do Gama, Brazil, Aug. 18, 1826; Natterer).—Wing, 6.80; tail, 4.00; culmen, .55; tarsus, 1.15; middle toe, .80. Facial circle, ear-tufts, and pileum sooty-blackish, on the latter broken by minute grayish and faint fulvous mottling, this prevailing on the forehead and eyebrows; outer webs of ear-tufts nearly uniform blackish, but inner webs conspicuously spotted or indented with pale fulvous and whitish. Orbital region dusky—conspicuously so in front of and above the eye—the face growing paler on the cheeks, next the blackish facial ring, where the color is pale grayish,

indistinctly undulated with darker. Occiput crossed by a quite conspicuous light-colored band, the feathers of which have the basal portion pale fulvous and the terminal portion whitish, with irregular dusky bars. Upper parts in general finely mottled grayish-brown, with indistinct streaks and zigzags of dusky and minute mottlings of very pale ochraceous; outer webs of scapulars whitish, more or less stained with buff. Tail dusky, with about seven bands of pale fulvous, each inclosing a narrower and more irregular dusky band; outer webs of primaries marked with quadrate spots of dusky and pale fulvous, the latter smallest, growing deeper-colored toward the shaft, and having occasional dusky mottlings centrally, the former mottled with fulvous gray along the edges of the feathers. Lower parts uniform pale dull buff, the feathers with narrow, but distinct, dusky, mesial streaks, and with scattered, irregular cross-bars of the same color, the latter averaging about *two* on each feather, and situated near the end: on the breast these markings more numerous and irregular, and the general surface broken by irregular spots of white. Tarsi pale buff, with faint mottlings of rusty-brown on the outer side; under tail-coverts with a single faint spot at the end of each feather.

REMARKS.—The appearance of this owl is peculiar from the dusky coloring of the face, especially around the eyes, the peculiar shade of the pale buff lower parts (which lacks the bright orange tint of other races), the sparseness of the markings below, and in the pinkish tinge of the axillars and under wing-coverts.

While it is all but certain that the specimen described above is the same as *Ephialites watsoni*, Cassin, there is considerable doubt as to its being equivalent to *Strix atricapilla*, Temm. The plate of the latter represents a much smaller bird, with altogether grayer tints above, and pure white, instead of fulvous, beneath. In fact, this plate calls instantly to mind the form described in this paper as *S. cassini* (see page 102), and were it not that the habitat of Temminck's bird is given, on good authority, as Brazil, I should not hesitate to identify it with the latter form. The writer examined some years ago the type-specimens of *Ephialites watsoni*, in the museum of the Philadelphia Academy, and as he recollects them they correspond quite closely, if not entirely, with the specimen described above. Still, they may be somewhat different. The figure given by Cassin in the "Journal" of the Academy (pl. xii, fig. 1) is extremely inaccurate as regards the details of coloration; but it may be observed that the coloring represents almost exactly the peculiar shades which we consider one of the chief characteristics of the present form. The following is the original description of *Ephialites watsoni*, in full:—

"Summit of the head black, with a few very minute pale spots, more numerous on the front and eyebrows. Shorter feathers of the ear-tufts black, others black also, but with their inner webs spotted or mottled with white. A semicircle above the eye, extending to the ear-tufts,

black; rigid feathers at the base of the bill black, with pale grayish terminations; feathers immediately below the eye gray, mottled and broadly tipped with black.

"Discal feathers grayish white, many of them speckled, and all tipped with black, presenting a white and black semi-collar or ruff on each side of the neck. Plumage of the throat with fine alternate bars of black and nearly white.

"Neck above with a well-defined collar, the feathers composing which are strongly fulvous, terminated with white and speckled with black.

"Back, rump, tail, and wing-coverts mottled and freckled with grayish white, upon a black ground, many of the feathers having about three to five very irregular transverse bands of whitish; on the wing-coverts and back some of the pale marks are almost circular with black centres; others are of irregular form also enclosing centres of black.

"External webs of the primaries black, with subquadrate nearly white bars, nearly all of which have black centres, assuming, also, a more or less well defined square form. Internal webs of primaries with alternate bands of different shades of black.

"Breast and entire inferior parts pale fulvous, every feather conspicuously marked on the shaft longitudinally with black, and with very irregular transverse bands and irregularly mottled with black; the black markings most numerous and most irregular on the breast. Many of the feathers on the breast with very pale, nearly white spots, having somewhat the appearance of being distributed in pairs.

"Tail black, with about seven or eight narrow irregular grayish bands, many of which have central lines of black.

"Tarsi feathered to the toes, pale fulvous white, mottled with black.

"Bill horn color at the base, whitish at the tip.

"Total length (of skin) about $9\frac{1}{2}$ inches, wing 7, tail $3\frac{1}{2}$ inches.

"Younger? Plumage above paler, with small spots and minute freckles of grayish white, scarcely assuming the appearance of bands.

"Breast with the dark markings predominating, and tending to form a broad pectoral band; lower parts of the body bright fulvous, with black marks.

"*Hab.* South America.

"This species bears some resemblance to *Ephialites atricapilla*, (Natt.) Temm. pl. col. 145, but is much larger, and has only one nuchal collar. The general color above is also much darker; the fulvous colouring of the inferior surface of the body is also a striking difference.

"One specimen of this species in the Rivoli collection is labelled 'Ore-noque', and another in the collection of the Academy is probably from South America."

The description given in the Journal of the Philadelphia Academy (vol. ii, p. 95) is essentially the same as the above.

γ. ustus.

Scops usta, SCL., P. Z. S. March 9, 1858, 132 (*Ega, Upper Amazons*.—Mus. Norwich); Trans. Zool. Soc. Lond. IV, 1859, 265, pl. lxi.—GRAY, Hand-l. I, 1869, 47.—BOUC., Cat. Av. 1876, 91.—SCL. & SALV., P. Z. S. 1866, 198; Ex. Orn. 102.

Scops brasilianus, subsp. *a. Scops ustus*, SHARPE, Cat. Strig. Brit. Mus. 1875, 111 (*Sarayaen and Chamicuros, E. Peru: Venezuela?*).

Habitat.—Upper Amazonia (*Ega*; SCL., *l. c.*; Chamicuros and Sarayaen, E. Peru, and Venezuela?; SHARPE, *l. c.*).

This form I have never seen, and therefore have to give descriptions at second hand. The original one (Sclater, *l. c.*) is as follows:—

“Supra saturate castaneo-brunnea, plumis omnibus nigro subtilissime vermiculatis; facie et gula pure castaneo-brunneis, hac pallidiore: linea post regionem auricularem, cornuum capitis extantium marginibus latis et pileo supero nigris: alarum pennis pallide castaneo brunneis nigro punctulatis, intus autem ochraceo-albidis, quinque et sex fasciis latis in pogonio externo, maculas quadratas efficientibus, nigris trans-vittatus; cauda ex eodem colore sed fasciis nigris pæne obsoletis: subtus clarius brunnea, lineis angustis longitudinalibus, scapus plumorum occupantibus, nigris parce notata: tectricibus alarum inferioribus sordide albis: tarsis pallide fulvis: rostro et pedibus flavis.

“Long. tota 8.5, alæ 7.0, caudæ 4.0, tarsi 1.2.

“*Hab.* *Ega*, on the Upper Amazon (H. W. Bates).”

The above description, and the plate accompanying it, represent a form of *Scops* of which I have never seen typical examples. It seems clearly to belong to *S. brasilianus*, of which it is probably a peculiar “strain”—hardly to be called the rufescent extreme (since the latter is to be found in the bright rufous phase of “*guatemalæ*”), but rather showing a very highly-colored condition, in which the rufous tint is spread rather than intensified, so as to more or less completely obliterate the usual white markings. The case seems to be somewhat parallel to that of *S. kennicotti* as compared with *S. asio*, and is probably more or less closely connected with climatic peculiarities of the district inhabited by the race; for instance, an excessive rain-fall and a prevalence of denser and darker forests than generally exist to the eastward.

According to Mr. Sclater (*l. c.*), this form “is distinguishable from every South American member of the genus . . . by its rich brown coloring above and below, and by the longitudinal lines below not being crossed as in *S. choliba* and *S. atricapilla*.”

Among the numerous specimens of *Scops brasilianus* in the series before me, is one which seems to approach quite nearly to the characters of this race, being devoid of sharply defined black bars below, where, in their place, are extremely irregular ragged zigzags of rusty rufous, the blackish shaft-streaks being unusually broad, and externally suffused with rufous; only the terminal half, or exposed portion, of the abdominal feathers is white, the entire breast, tibiæ, and tarsus having a uniform deep ochraceous ground-color. Among other differences from

typical *brasilianus* may be mentioned the deep buff or ochraceous outer webs of the scapulars, inner webs of the ear-tufts, and indeed all the markings of the upper surface, which are white in that form; these peculiarities being among the distinguishing features of the *ustus* type. This specimen, however, is from Sta. Catarina, S. E. Brazil. It belongs to the collection of Messrs. Salvin and Godman.

In his description of this form, Mr. Sharpe describes what he terms its "gray phase", but which seems to be decidedly more brown than gray, and, to judge from the description, quite different from anything I have seen. I quote the essential parts of the descriptions of this form given by Mr. Sharpe:—

"*Adult male* (gray phase). General color above dull earthy brown, so finely vermiculated as to appear almost uniform at first glance, a few fulvescent cross markings more conspicuous on the scapulars and secondaries, very slightly indicated on the hind neck, and not forming a distinct collar; crown of head rather blacker than the back, the feathers infinitesimally freckled with sandy rufous, the ear-tufts blackish, scarcely vermiculated at all; ear-coverts sandy brown, indistinctly barred across with blackish brown, and narrowly shaft-streaked with white; rest of under surface ochraceous buff, thickly sprinkled with wavy lines and vermiculations of dark brown, especially on the side of the chest, some of the breast feathers streaked with black and barred across with white, the flanks scantily barred with dark brown, inclining to white near the tip, the markings scanty, as also on the under tail-coverts Total length 9.5 inches, wing 6.6, tail 3.9, tarsus 1.3.

"*Adult female* (rufous phase). General characteristics as in the gray phase, but rufous where the other bird is brown, and slightly more mottled on the upper surface with rufescent cross bars; below nearly uniform rufous, deeper on the chest, some of the feathers slightly streaked with black, more narrowly on the breast and abdomen; on the chest a few dull brown vermiculations, the abdomen indistinctly barred with fulvous. Total length 9 inches, wing 6.55, tail 3.4, tarsus 1.3.

"*Obs.* The principal characteristics of this race are the uniformity of its upper surface, and the comparative absence of streaks; scapulars fulvescent, not white. These remarks apply both to the brown and rufous phases, neither of which shows any collar on the hind-neck.

"*Hab.* Upper Amazons."

δ. guatemalæ.

"*Scops brasilianus*", LAWR., *Ann. Lyc. N. Y.* IX, 1868, 132 (*San José, Costa Rica*).—SALVIN, *P. Z. S.* 1870, 216 (*Veragua*).

Scops brasilianus, subsp. *β. Scops guatemalæ*, SHARPE, *Cat. Strig. Brit. Mus.* 1875, 112, pl. ix, both phases (*Guatemala; Acayapa, Nicaragua; Costa Rica; Veragua*).

Scops guatemalæ, BOUC., *Cat. Av.* 1876, 91 (*Central America*).

REMARKS.—In Central America, from Veragua to Guatemala, a form prevails which, in the absence of extralimital specimens or of examples

approximating one of the other styles, I should not hesitate to characterize as a distinct species. This style is "*S. brasiliensis*, subsp. β . *Scops guatemalæ*" of Sharpe (*l. c.*), to which probably as many as 90 per cent. of the specimens brought from those countries may be referred. It happens, however, that while absolutely typical specimens of the "*brasiliensis*" style *do* occur from both these countries, specimens of typical "*guatemalæ*" also occur in Brazil, thus annulling the importance of geographical considerations; while, as a further proof of specific identity, the number of specimens which cannot be referred to either one or the other of these two forms, but which are in every respect intermediate, is by no means small.

The prominent features of this variety are, a confusedly-mottled, rather than regularly-barred, lower plumage, and a darker upper surface, there being little approach to that sharpness and clearness of all the markings which characterize the other form; the bright orange-buff bases of the feathers of the lower parts, so usual (*but not constant*) in typical specimens of the "*brasiliensis*" style, is also absent in all the specimens I have seen. As in the latter variety, the individual variations in "*guatemalæ*" tend to great extremes, both as to the shades of coloration and the pattern of the markings; the principal of these are the following:—

Gray extreme (spec. in Mus. Salvin & Godman, Coban, Vera Paz, Jan. — "O. S. 2352"):—Prevailing color above pale brownish, *very coarsely* mottled with pale buff and grayish-white, and with larger and very irregular spots of blackish, these nowhere assuming the form of shaft-streaks, even on the crown; sides of the forehead or "eyebrows" appreciably, but not abruptly, paler (mottled whitish). Face, throat, sides of neck, and jugulum dirty whitish, finely and quite regularly undulated transversely with brownish, the dusky facial circle not distinct. Rest of lower parts soiled white, the whole surface relieved by *very irregular, ragged, and confused zigzag lines* of dusky brownish, the feathers showing very irregular, but quite distinct, mesial, blackish streaks, with which the transverse markings unite.

The above description is of a specimen representing the extreme grayish phase, so far as shown by the series before me; others, in Messrs. Salvin and Godman's collection, exhibit a gradual transition to the rufous phase, scarcely two specimens being alike in the precise shade of brown, while positively none agree in the details of pattern. Thus, two males from Veragua ("Arcé, 2401", and "Arcé, 1806") have the upper parts so nearly devoid of coarse mottlings as to appear of a nearly uniform light umber-brown. On the other hand, a specimen from Vera Paz ("O. S. 2348") has the general dusky coloring above relieved by very conspicuous, large, and, in places, regularly-oblong, transverse spots of pale fawn-color. In the latter specimen, the white on the outer web of the scapulars is broken by transverse wide bars of mottled fawn and dusky, while in nearly all the others this white is unbroken, having only the terminal blackish border common to nearly all the species of the genus.

There is also much variation as to the markings of the lower parts; usually, these are very numerous, and extremely ragged and zigzag, consequently appearing much confused; in two specimens, however, one from Choctum, Vera Paz, the other from Bahia, Brazil (Wucherer), the transverse markings are much fewer, wider apart, and more regular, the average interval being, in the latter specimen, as much as .25 of an inch!

The most aberrant specimen in the series is one from Chiriqui ("Arcé, 1873"), which, however, appears, from the texture of its plumage, to be a young bird. In this all the markings are very fine zigzag vermiculations, *there being no longitudinal streaks above or below*, except a few among the feathers of the breast. The shades of colors, however, are identical with those of others in the series.

A specimen of gray plumage from Mazatlan, Mexico (No. 23793, Nat. Mus.; John Xantus), agrees strictly with the Choctum specimen described above in the markings of the lower parts; but the upper parts are grayer, with conspicuous mesial streaks of black, mostly of sagittate form, agreeing exactly in this respect with a specimen of "*brasilianus*" from Pernambuco, Brazil, in the collection of the Museum of Comparative Zoölogy (No. 7805).

The extreme rufous phase is represented in the series by two specimens from Guatemala (belonging to the Boston Society of Natural History). These are bright brick-rufous above, the outer webs of the scapulars pure white, in strong contrast, and the feathers of the pileum with mesial streaks of black,—thus very closely resembling the corresponding phase of *S. asio*. The face, throat, and jugulum are also of a paler, but quite uniform, rufous, relieved by few or no markings of any kind; the rest of the lower parts are white, the feathers with indistinct mesial streaks of dusky brownish and faint and ragged cross-bars of pale rufous. These specimens resemble the extreme rufous phase of "*brasilianus*", as described above, except that there are no distinct blackish streaks on the back, where also the feathers are devoid of the basal fulvous spots, while the bars on the lower surface are much less distinct and regular.

Two other specimens of this phase in the collection of Messrs. Salvin and Godman are quite different. One, from Coban, Vera Paz, is a young bird, with remnants of the immature plumage. The new dress however, largely prevails. In this example, the whole dorsal region is varied by an exceedingly faint, yet obvious spotting of a paler rufous, and narrow blackish shaft-streaks, and the lower parts are much more distinctly and regularly barred, the bars being, moreover, of a considerably darker shade. It thus approximates quite closely to the rufous specimen of "*brasilianus*" above referred to. The other specimen is from Las Salinas, Vera Paz ("March, O. S. 2349"), and is still more different. The upper parts are so dark as to be almost chestnut, while the back is distinctly *spotted* with black. The breast is nearly uniform dark

ferruginous, with distinct and wide blackish shaft-streaks, and broken in the middle portion by whitish bars; the remainder of the lower parts are white, with the transverse bars of *blackish* so broad that the mesial streaks are rendered nearly obsolete.

Regarding the rufous phase of this variety, Mr. Sharpe remarks (*l. c.* p. 114):—

"The rufous phase of *S. guatemalæ* is quite different from anything that I have seen from South America, being entirely of a foxy rufous color, with the head never darker than the back or showing any approach to a blackish patch; the back is generally rather narrowly streaked with black, as is also the head; and there are in some examples slight indications of bars." As stated on p. 94, however, the Brazilian bird does sometimes assume this bright "foxy rufous" phase.

A specimen in the bright rufous phase from Jalapa (S. E. Mexico; D'Oca; Mns. Salvin & Godman) differs from the two Guatemala specimens described above in the paler rufous of the pileum (where the usual black shaft-streaks are almost entirely absent), the paler rufous of the face and throat, the coarser and more ragged markings of the lower surface, and the paler tarsi. In other respects, however, it is identical. Compared with a rufous specimen of *S. cassini*, from the same locality, the differences are much more conspicuous. The latter is more like the corresponding phase of *S. barbarus*, being distinctly variegated above with paler spotting and numerous blackish shaft-streaks, and the *picture* of the lower parts more distinct.

List of Specimens Examined.

26 L.	Guatemala		G. N. L.	—g.	6.80	3.90	.58	1.30	.90
— L.	do.		do.	—g.	6.55	3.80	.58	1.10	..
2401 Arcé.	Chitra, Veragua	—, 1869	S. & G.	♂g.	6.20	3.60	.55	1.12	.85
2352 O. S.	Coban, Vera Paz	—, 1860	do.	—g.	6.50	4.00	.52	1.20	.90
2348 O. S.	Vera Paz, Guatemala		do.	—g.	6.60	4.10	.55	1.15	.85
—	Choctum, Vera Paz	Feb —, 1862	do.	—g.	6.60	3.90	.58	1.18	.80
1806 Arcé.	Calovevora, Veragua	—, 1868	do.	♂ br.	6.60	3.85	.58	1.15	.85
1873 Arcé.	Chiriqui		do.	Juv. gr.	6.20	3.50	.60	1.10	.80
—	Bahia, Brazil		do.	Ad. gr.	6.50	4.00	.55	1.25	.80
2349 O. S.	La Salinas, Vera Paz	Mar. —, 1860	do.	Ad. red.	6.50	4.00	.55	1.18	.85
—	Coban, Vera Paz	—, 1859	do.	Ad. red.	6.50	3.90	..	1.20	.85
—	Guatemala		Bost. Soc.	Ad. red.	6.30	3.80	.58	1.20	.82
—	do.		do.	Ad. red.	6.48	3.70	.55	1.30	.82
23793	Mazatlan, W. Mex		U. S.	Ad. gr.	6.00	3.70	.50	1.18	.82
—	E. Mexico (Jalapa)	—, 1872	S. & G.	Ad. red.	6.20	3.60	.55	1.25	.80
55978	Costa Rica		U. S.	Ad. gr.	6.60	3.90	..	..	..

ε. cassini.

"*Scops atricapillus* (NATT.) STEPH.", RIDGW., in B. B. & R. Hist. N. Am. B. III, 1874, 48 (foot-note).

Scops brasilianus, *ε. cassini*, RIDGW., MS.

Habitat.—Eastern Mexico (Mirador; Jalapa).

DIAGNOSIS.—Wing, 5.80–6.10; tail, 3.20–3.50; culmen, .45–.50; tarsus, 1.20; middle toe, .80.

Gray phase; adult.—Above grayish-brown, finely mottled with lighter and darker shades, the general dusky brownish hue interrupted by two conspicuous lighter bands, one across the nape, and the other across

the occiput, where the pale brownish buff spots are very large and the darker markings correspondingly reduced in size. Beneath whitish, the feathers with ragged mesial streaks of blackish and transverse vermiculations of the same.

Rufous phase; adult.—Above cinnamon-rufous, with blackish shaft-streaks. Beneath white, with blackish mesial streaks and irregular transverse base of rufous and blackish.

REMARKS.—This very distinct race, which I refer somewhat doubtfully to *S. brasilianus*, so closely resembles *S. maccalli*, both in size and colors, that, were it not for the perfectly naked toes, certain specimens of the two could scarcely be distinguished. From *S. barbarus*, with which it agrees in the nakedness of the toes, it may be readily distinguished by the much stouter feet (both relatively and absolutely), as well as by certain well marked differences in the coloration. Of the other races of *brasilianus*, it most closely resembles the one we have described under the name of *atricapillus* (see p. 95), having, like that style, a very distinct lighter nuchal collar. It is considerably smaller, however, and presents well-marked differences in coloration, which may be expressed as follows:—

S. ATRICAPILLUS.—Wing, 6.80; tail, 4.00; tarsus, 1.15; middle toe, .80. Ground-color below pale buff; face and crown nearly uniform dusky. *Hab.*, Brazil.

S. CASSINI.—Wing, 5.80–6.10; tail, 3.20–3.50; tarsus, 1.20; middle toe, .80. Ground-color below white; face grayish or brownish white, coarsely barred with dusky; crown coarsely spotted with blackish, pale brown, and grayish-white. *Hab.*, Eastern Mexico.

It will be seen by the above, that while *cassini* has the wing and tail very much shorter than in *atricapillus*, the feet are, on the other hand, actually longer, the two birds thus having quite different proportions, in view of which fact it may ultimately prove advisable to recognize in *S. cassini* a distinct species. Compared with *S. barbarus*, which is sometimes exceedingly similar in plumage, the difference in the feet is still more striking; while the only other form which resembles it—*S. maccalli*—has the toes distinctly bristled, whereas in the present form they are perfectly bare.

27115	U. S.	Gr. ad.	Mirador, Mexico	Nov. —, 1863	6.10	3.50	.50	1.20	.80
33556	U. S.	Gr. ad. ♀	do	Nov. —, 1863	5.90	3.40	.45	1.20	.80
12372	M. C. Z.	Ruf. ad.	Jalapa, Mexico	Apr. 9, 1869	5.80	3.20	.50	1.20	.80

3. SCOPS BARBARUS.

"*Scops flammeola*", SALVIN, Ibis, 1861, 355 (*nee* Licht.).

Scops barbarus, SCL. & SALV., P. Z. S. 1868, 57: Ex. Orn. 1, 1868, 101, pl. li; Nom. Neotr.

1873, 117 (*Guatemala*).—GRAY, Hand-l. I, 1869, 47.—SHARPE, Cat. Strig. Brit.

Mus. 1875, 107 (*Sta. Barbara, Vera Paz, Guatemala*).—BOVC., Cat. Av. 1876, 91.

Habitat.—Guatemala.

DIAGNOSIS.—Wing, 5.25–5.60; tail, 2.90–3.10; culmen, .45; tarsus, 1.00–1.05; middle toe, .70–.75. *Shafts of the auriculars produced into*

long, slender, hair-like bristles, forming a conspicuous ruff round the face, the anterior side concave. *Gray phase (adult)*:—Above brown, thickly spotted with black, the black prevailing on the pileum; outer webs of scapulars white, bordered terminally with black. Beneath whitish, the feathers marked with transverse bars and mesial stripes of black, the white of opposite webs having the form of roundish or oblong spots. *Rufous phase (adult)*:—Above cinnamon-rufous, all the feathers (except upper tail-coverts) with wide and distinct mesial streaks of black. Beneath white, the feathers with shaft-streaks of black and wide cross-bars of rufous having black borders.

REMARKS.—This very distinct species is apparently most nearly related to *S. flammeolus*, with which it agrees in the extreme weakness of the feet. It differs, however, from that form in being of much stouter build, more “fluffy” plumage, the head appearing larger and the body stouter in consequence of the greater length and looseness of the feathers. The plumage also is quite different, the markings being altogether coarser. The differences between the two have been more precisely expressed on a preceding page. From *S. cassini*, which it sometimes very closely resembles in colors, it may be immediately distinguished by its much weaker feet and different proportions, as follows:*

SCOPS BARBARUS.—Wing, 5.25–5.60; tail, 3.10; tarsus, 1.00–1.05; middle toe, .70–.75. *Hab.*, Highlands of Guatemala.

SCOPS CASSINI.—Wing, 5.80–6.10; tail, 3.20–3.50; tarsus, 1.20; middle toe, .80. *Hab.*, Eastern Mexico (Vera Cruz, etc.).

42776	U. S.	Ad.	Central Guatemala . . . . .	.... (?) . . .	5.60	3 10	.45	1.00	.75
—	S. & G.	Ad. gr.	Vera Paz, Guatemala . . .	—, 1862	5.60	3.10	.45	1.00	.70. [Type.]
—	S. & G.	Ad. r.	Sta. Barbara, Guatemala	Apr.—, 1860	5.35	3.10	.45	1.00	.70. [Type.]

4. SCOPS FLAMMEOLUS.

“*Strix flammeola*, LICHT., MS., in Mus. Berol., undē.”

Ephialites flammeola, LICHT., Nom. 1854, 7.

Megascops flammeola, KAUP, Trans. Zool. Soc. Lond. IV, 1859, 226.

Scops flammeola, SCL., P. Z. S. 1868, 96.—SCHLEG., Mus. P.-B. Oti, 1862, 27; Rev. Acc. 1873, 14.—SCL. & SALV., P. Z. S. 1868, 57; Ex. Orn. VII, July, 1868, 99, pl. 1.; Nom. Neotr. 1873, 117 (*Mexico; Guatemala*).—GRAY, Hand-l. 1, 1870, 47.—ELLIOT, Illustr. Am. B. I, 1869, pl. xxviii.—COUES, Key, 1872, 203; Check List, 1873, 65, No. 319.—RIDGW., in B. B. & R. Hist. N. Am. B. III, 1874, 58, fig. (*Guatemala; Mexico; Sierra Nevada, n. to Ft. Crook, Cal., where breeding*); Field & Forest, June, 1877, 210 (*Boulder Co., Col.; March*).—“Iris umber-brown”!; Orn. 40th Par. 1877, 335, in text (*Nevada, Cal.?*).—HENSHAW, Orn. Wheeler’s Exp. 1874, 135 (30 m. south of *Apache, Ariz.; Sept. 11*).—SHARPE, Cat. Strig. Brit. Mus. 1875, 105 (*Duenas, Guat.; W. Mexico; Valley of Mexico*).—BOUC., Cat. Av. 1876, 91 (*Mexico*).

Flammulated Owl, COUES, l. c.

Feilner’s Owl, B. B. & R., l. c.

Habitat.—Highlands of Guatemala and Mexico, north to latitude 40° in the Sierra Nevada and Rocky Mountains of the United States.

* SCOPS FLAMMEOLUS.—Wing, 5.10–5.60; tail, 2.60–3.00; tarsus, .90–1.00; middle toe, .60–.68.—*Hab.*, Highlands of Guatemala, Mexico, and Western United States north to about 40°.

DIAGNOSIS.—Wing, 5.10–5.60; tail, 2.60–3.00; culmen, .35–.40; tarsus, .90–1.00; middle toe, .60–.68. *Adult*.—Above finely-mottled grayish, the feathers with irregular blackish shaft-streaks. *Outer webs of scapulars more or less strongly washed with orange-rufous* on a white ground; outer webs of lower middle wing-coverts white, forming conspicuous spots. Ground-color below white, the feathers with very distinct mesial black streaks, from which proceed narrower transverse lines, mostly toward the end of the feathers. *Juv.*—Above finely-mottled grayish, but the mottlings all transverse and the shaft-streaks wanting; below coarsely and rather dimly barred with dark grayish on a dull whitish ground, and with no longitudinal markings. *Iris umber-brown!* (*vide* Mrs. M. A. Maxwell).

REMARKS.—Specimens vary chiefly in the amount of rufous wash on different parts of the plumage. A wash of this color is usually present on the pileum, while it sometimes spreads over the face, throat, and back; Mr. Sharpe (*l. c.*) even mentions a specimen, from Guatemala, which is entirely orange-rufous above, and strongly pervaded by the same color on the lower surface, especially on the throat, where it forms a large patch. He also mentions “a perfectly gray bird, on which scarcely a tinge of orange coloring remains, either above or below, while the whole appearance of the specimen is dingy, owing to the closeness and frequency of the vermiculations.” I have never seen a specimen representing either of these extreme phases, all the specimens before me (seven in number) being of average coloration.

42157	U. S.	Ad.	Orizaba, Mex.	Feb. 3, 1865	5.50	2.83	.40	.90	.65
24172	U. S.	♂ juv.	Fort Crook, N. Cal.	Aug. 23, 1860	5.50	3.00	.35	.92	.60
—	U. S.	Ad.	30 miles S. of Apache, Ariz.	Sept. 11, 1873	5.28	2.73	.....	.....	.....
—	M. A. M.	Ad.	Boulder, Colorado* .....	.....	5.50	3.10	.35	.95	.60
—	S. & G.	Ad.	Dueñas, Guatemala	Jan. —, 1863	5.50	2.90	.40	1.00	.68
—	S. & G.	Ad.	do	—, 1863	5.50	2.90	.40	.90	.60
—	S. & G.	Ad.	Valley of Mexico .....	.....	5.10	2.75	.35	.90	.60

* *Iris umber brown!*

C.—Toes partly covered with hair-like, bristly feathers, the terminal scutellæ only completely naked.

In this group are included only *S. asio*, *S. trichopsis* (?), and *S. cooperi*, all of which belong to the country north of the Isthmus of Panama, there being, so far as known, no South American species with hairy toes. The species of this group may be distinguished as follows:—

S. ASIO.—Bars of the lower surface coarse, and frequently double, especially on the flanks. *Hab.*, Whole of the United States; south to Guatemala; north to Sitka.

S. TRICHOPSIS ?—Bars of the lower surface fine, nearer together than in *S. asio*, and more uniformly distributed. General aspect paler, with much finer vermiculations.

S. COOPERI.—Bars of the lower surface in form of dense, fine, zigzag vermiculations.

The differences between *Scops asio* and the species here called *S. trichopsis* do not, it is true, seem to be very great, according to the characters given above. It is not the *amount* of difference, however, between these two forms which has induced me to recognize them as distinct species, but the *constancy* of the differences pointed out; *S. asio* having in every one of its numerous geographical and local races the bars of the flanks, etc., coarse and frequently double, while all the specimens of *S. trichopsis* which have come under my notice have these bars much finer and denser, with no disposition to be arranged in pairs. Mr. Sharpe also lays stress upon the same differential characters.

5. SCOPS ASIO.

a. asio.

Strix asio [= *rufous phase*], LINN., S. N. I, 1766, 132 (based on *Noctua aurila minor*, Catesb., Carol. I, 73.—*Asio scops carolinensis*, Briss., Orn. I, 497).

Scops navia [= *gray phase*], GMEI., S. N. I, i, 1788, 289 (based on *Mottled Owl*, Arct. Zool. II, 1785, 231, no. 118, t. xi).

Bubo striatus [= *gray phase*], VIEILL., Ois. Am. Sept. I, 1807, 54, pl. 21.

? "*Ephialites ocreata*, LICHT., in Mus. Berol."

β. maccalli.

Scops McCallii, CASS., Illustr. B. Cal. Tex. &c. July, 1854, 180; in Baird's Birds N. Am. 1858, 52.

Scops asio, var. *enano*, "LAWR., MS.", Ridgw., Bull. Essex Inst. V, Dec. 1873, 200.

γ. kennicottii.

Scops kennicottii, ELLIOT, Pr. Ac. Nat. Sci. Phila. 1867, 69; Illustr. Birds Am. 1869, p. xxvii, pl. ii.

δ. floridanus.

Scops asio, var. *floridanus*, RIDGW., Bull. Essex Inst. V, Dec. 1873, 200.

ε. maxwellii.

Scops asio, *ε. maxwellii*, RIDGW., Field and Forest, June, 1877, 210, 213.

The chief differential characters of the several geographical races of this widely distributed owl may be expressed as follows:—

Colors smoky-brown or dusky umber, and pale fulvous, with little or none of pure white. Outer webs of scapulars pale fulvous. Never bright rufous.

1. Wing, 6.85–7.60; tail, 3.50–4.50. Apparently not varying to rufous. *Hab.*, The Northwest coast, from Oregon to Sitka; Idaho. *γ. kennicottii*.

Colors much lighter, some shade of ashy-gray or grayish-brown above, pure white beneath. Outer webs of scapulars pure white. Sometimes bright rufous, with white and black markings.

2. Wing, 6.10–7.80; tail, 3.30–4.35. Varying, in the Eastern, but not in the Western, Province, to bright rufous. In the rufous phase, white prevailing on the lower surface, where the red markings are not broken into transverse bars. *Hab.*, Whole of the United States, except the high western mountains, and the Gulf coast. *a. asio*.

3. Wing, 5.50–6.00; tail, 2.75–3.10. Varying to bright rufous; in the rufous phase, red prevailing on the lower parts, where the markings are much broken into transverse bars. *Hab.*, Florida and S. Georgia. *δ. floridanus*.

4. Wing, 5.50-5.90; tail, 2.80-3.50. Varying to bright rufous; gray phase like that of *asio* and *floridanus*, but the mottling above much coarser, and the nape with a strongly indicated collar of rounded white spots, in pairs, on opposite webs. Red phase much more spotted above than that of *asio* or *floridanus*. *Hab.*, E. Mexico and highlands of Guatemala.....*β. maccalli*.
5. Wing, 6.80-6.90; tail, 3.90-4.10. Not varying to rufous. General aspect much paler than any of the preceding; above pale ash-gray, or very pale cinnamon-gray, the white of the outer webs of the lateral scapulars very conspicuous, the white spots of the outer webs of the primaries sometimes confluent. Beneath pure white, much more sparsely marked than in *asio* and other races. *Hab.*, Mountains of Colorado.....*ε. maxwelli*.

The characters given above are sufficient to distinguish typical specimens of several well-marked geographical forms of *Scops asio*. It is of course understood that specimens possessing intermediate characters frequently occur; but it is equally true that a very large majority of the specimens from either one of the regions indicated above are typical of the form characteristic of the locality.

a. asio.

The Little Owl, CATESBY, Carolina, I, 1731-248, 7, pl. 7.

Noctua aurita minor, CATESBY, l. c.

Asio scops carolinensis, BRISS., Orn. I, 1760, 497.

Le Petit Duc de la Caroline, BRISS., l. c.

Strix asio, LINN., S. N. I, 1766, 132 (based on *Noctua aurita minor*, Catesby, Carol. I, 7.—*Asio scops carolinensis*, Briss. I, 497).—GMEL., S. N. I, i, 1788, 287.—LATH., Ind. Orn. I, 1790, 54; Gen. Hist. I, 1-21, 314.—DAUD., Tr. Orn. II, 1800, 216.—SHAW, Gen. Zool. VII, 1809, 229.—WILS., Am. Orn. V, 1812, 83, pl. 42, fig. 1.—TEMM., Pl. Col. II, 1838, pl. 80 (gray phase).—BONAP., Ann. Lyc. N.Y. II, 1826, 36; Synop. 1828, 36; Isis, 1832, 1139.—JARD., ed. Wilson, I, 1831, 307.—AUD., Orn. Biog. I, 1832, 486; V, 1839, 392, pl. 97.—NUTT., Man. I, 1832, 120.—BREWER, ed. Wilson, 1852, 687.—HOBS., Nat. 1855, 165.

Scops asio, BONAP., Comp. List, 1838, 6; Consp. I, 1850, 45.—LESS., Traité, I, 1831, 107.—KAUP, Contr. Orn. 1852, 112.—CASS., Illustr. B. Cal. Tex. &c. 1854, 179; in Baird's B. N. Am. 1858, 51.—HEERM., Pacific R. R. Rep. II, 1855, 35.—STRICKL., Orn. Syn. I, 1855, 199.—BREWER, N. Am. Owl. 1857, 65.—BAIRD, Cat. N. Am. B. 1859, no. 49.—? SCHLEG., Mus. P.-B. Oti, 1862, 27; Rev. Acc. 1873, 9.—GRAY, Hand-l. I, 1869, 46.—COOPER, Orn. Cal. I, 1870, 420.—MAYN., Naturalist's Guide, 1870, 131 (*Mass.*).—COUES, Key, 1872, 202; Check List, 1873, 65, no. 318.—B. B. & R., Hist. N. Am. B. III, 1874, 49.—SHARPE, Cat. Strig. Brit. Mus. 1875, 114 (*Delaware; Toronto*).—RIDGW., Bull. Essex Inst. Oct. 1874, 172 (*Sacramento, Cal.*); Orn. 40th Par. 1877, 336, 389, 518, 571 (*Sacramento and Nevada, Cal.*).—D'HAMONDY., Ois. Eur. 1876, — (*Europe*).—BOUC., Cat. Av. 1876, 91.

Bubo asio, VIEILL., Ois. Am. Sept. I, 1807, 53, pl. 21.—AUD., Synop. 1839, 29; Birds Am. I, 1840, 147, pl. 40.—DEKAY, Zool. N. Y. 1844, pl. 12, figs. 25, 26.—GIRAUD, Birds L. I. 1844, 28.—MAX., J. f. O. 1858, 23.

Otus asio, STEPHENS, Shaw's Gen. Zool. XIII, ii, 1826, 57.—SCHLEG., Fauna Japon. 1845, 25.

Asio asio, LESS., Man. Orn. I, 1827, 117.

Ephialites asio, GRAY, Genera B. I, 1844, 38; List B. Brit. Mus. 1844, 96.—WOODH., Sitgreaves's Exp. 1853, 62.

Megascops asio, KAUP, Trans. Zool. Soc. Lond. IV, 1859, 228.

Strix asio, capite aurito, corpore ferrugineo, the little screech owl, BARTRAM, Travels, 1791, 289.

Red Owl, PENN., Aret. Zool. II, 1785, 231, pl. xi, fig. 1.

Mottled Owl, PENN., t. c. pl. xi, fig. 2.

Strix varia, Gmel., S. N. I, i, 1788, 289.—LATH., Ind. Orn. I, 1790, 55; Gen. Hist. I, 1821, 321.—DAUD., Tr. Orn. II, 1800, 217.—SHAW, Gen. Zool. VII, 1809, 230.—WILS., Am. Ord. III, 1812, 16, pl. 19, fig. 1.

Asio varia, LESS., Man. Orn. I, 1827, 117.—BONAP., Rev. et Mag. de Zool. 1854, 543.

Otus navius, CUV., Règ. Anim. ed. 2, 1829, 241.

Surnia varia, JAMES., ed. Wils. I, 1831, 96, 99.

Bubo striatus, Vieill., Ois. Am. Sept. I, 1807, 54, pl. 21.

"*Ephialites ocreata*, LICHT., in Mns. Berol."

"*Scops asio* var. *maccalli*", HENSHAW, Orn. Wheeler's Exp. 1874, 135 (*Gila R., Camp Grant, and San Pedro, Arizona*); *ib.* 4to Rep. 1875, 405 (*Arizona and New Mexico*).

Without repeating here a detailed description of the plumages of this form, for which the reader is referred to the "History of North American Birds" (vol. iii, pp. 49-51), a few remarks concerning local and geographical variations may suffice. The most noteworthy point in this connection is the apparently established fact that while this bird very frequently varies to bright lateritious-rufous in the Eastern Province of the United States (this erythrismal phase even very largely predominating in some localities*), it seems *never* to assume this plumage in the Western States and Territories. At the same time, there seems to be no difference whatever in specimens of the gray phase from the Atlantic States and California, as well as other of the Western States and Territories, if we except those districts inhabited by different races (*i. e.*, *kennicotti*, *maxwellii*, etc.). There are now before me the following specimens representing the adult of this phase, belonging to my own collection: a pair from Nicasio, California, a male from Sacramento, a male from Arizona (San Pedro River), a female from Southern Illinois, a male from the District of Columbia, and another from Virginia. Of these, the two California specimens and the examples from Illinois and Virginia are so precisely similar that were their labels taken off or interchanged it would not be possible to distinguish them by colors and markings. The Arizona example differs solely in being of a purer ash-gray shade, the others being of a more brownish-gray; the Sacramento specimen is similar to those from Nicasio, only lighter-colored, being a midsummer specimen, in faded plumage, while the others were killed in October, and consequently in possession of the new fall dress. The skin from the District of Columbia differs from the others in having a very decided cinnamon cast to the plumage, thereby exhibiting a ten-

* Whether the relative number of specimens of the two phases in a given locality has anything to do with geographical or climatic considerations, I have not the material to enable me to determine. Certain it is, however, that while in the States bordering the Atlantic the gray phase is generally quite as common as the other, it is so extremely rare in the Lower Wabash Valley that I have seen there but two individuals in the course of many years' observation, the red specimens constituting fully 95 per cent. of all. This has also been the experience of others whom I have questioned regarding the matter.

dency toward the rufous phase; all the markings, however, are as in the grayish birds. The measurements of these specimens are as follows:—

—	R. R.	♂ ad.	Nicasio, Marin County, Cal.	Mar. 2, 1877	6.30	3.50	.....	.....
—	R. R.	♂ ad.	do.	Mar. 2, 1877	6.60	3.65	.....	.....
152	R. R.	♂ ad.	Sacramento, Cal.	June 21, 1867	6.70	3.60	.....	.....
2749	R. R.	♂ ad.	San Pedro River, Arizona	Oct. 4, 1873	6.60	3.70	.....	.....
—	R. R.	♂ ad.	Mount Carmel, S. Ill.	Oct. 7, 1876	6.40	3.50	.....	.....
—	R. R.	♂ ad.	Fairfax County, Virginia	Nov. 4, 1876	6.50	3.70	.....	.....
—	R. R.	♂ ad.	District of Columbia	Dec. 7, 1874	6.35	3.25	.....	.....

Three specimens in the rufous phase, also in my collection, measure as follows:—

953	R. R.	♂ ad.	Mount Carmel, Ill.	May 1, 1869	5.90	3.20	.....	.....
954	R. R.	♂ ad.	do.	July 30, 1870	6.00	3.00	.....	.....
2606	R. R.	♀ ad.	District of Columbia	Nov. 8, 1860	6.50	3.60	.....	.....

The first of these specimens inclines very decidedly, both in measurements and plumage, to var. *floridanus*; and, in view of the fact that typical specimens of *Ortyx virginianus floridanus*, *Tinnunculus sparverius isabellinus*, and other Southern forms occur in the same locality, may be perhaps best referred to that form.

β. maccalli.

Scops McCalli, CASS., Illustr. B. Cal. Tex. &c. July, 1854, 180 (*Texas*; *Northern Mexico*); in Baird's B. N. Am. 1858, 52; ib. ed. 1860, pl. xxxix (part).—BAIRD, Mex. Bound. Survey. II, pt. iv, Birds, 1859, pl. 1; Cat. N. Am. B. 1858, no. 50.—STRICKL., Orn. Syn. I, 1855, 200.—SCL. & SALV., Ibis, 1859, 220.—GRAY, Hand-l. I, 1869, 47.

"*Scops trichopsis*", GRAY, Hand-l. I, 1869, 47 (Sharpe).—SCL. & SALV., Nom. 1873, 117 (*Mexico*; *Guatemala*).

Scops asio var. *enano*, "LAWR.", RIDGW., Bull. Essex Inst. V, Dec. 1873, 200 (*E. Mexico*; *Guatemala*); in B. B. & R., Hist. N. Am. B. III, 1874, 48 (do.).

Scops enano, BOUC., Cat. Av. 1876, 91 (*Mexico*).

Scops asio, subsp. *γ*. *Scops enano*, SHARPE, Cat. Strig. Brit. Mus. 1875, 118 (*Mexico*; *W. Mexico*).

Habitat.—Eastern and Northern Mexico; Guatemala; Texas (*Cassin*).

DIAGNOSIS.—Wing, 5.60–5.90; tail, 3.10–3.50; culmen, .45–.50; tarsus, 1.00–1.15; middle toe, .70–.75. *Gray phase (adult)*.—Similar to the gray adult of *S. cassini*, but toes bristled, the occipital collar nearly obsolete, and the nuchal collar less distinct. *Red phase (adult)*.—Above dull rusty, much broken across the nape by a collar of pale ochraceous spots, the whole surface elsewhere being also more or less mottled with paler rusty than the ground-color, and relieved by ragged mesial streaks of black. Lower parts pale rufous, each feather crossed near the end by a wide white bar, and with two to three narrow, somewhat irregular lines of blackish.

Young.†—Above brownish-gray, transversely mottled with darker and paler, and *without dusky shaft-streaks*. Below grayish-white, with

* Dueñas, Guatemala. In Mus. Salvin & Godman.

† Coban, Vera Paz. In Mus. Salvin & Godman.

badly-defined bars of pale grayish-brown, the feathers somewhat ochraceous beneath the surface. Wings and tail as in the adult.

REMARKS.—The gray phase of this form is exceedingly similar in general appearance to that of *S. cassini*, not only above but also on the lower surface. The upper parts are more coarsely mottled, however, and the pale bands across the lower part of the nape and occiput are less conspicuous, especially the latter. The rufous phase is more like that of *S. barbarus*, the upper parts in particular being quite similar. On the lower parts, however, there is more rufous, while the black cross-lines are more distinct as well as more numerous. The species may be distinguished from all the other Mexican and Tropical American species (except from *S. cooperi*, from Costa Rica) by the distinctly bristled toes. In the latter feature, it agrees with *S. asio* of the United States, but is considerably smaller, while the red phase is very different from the corresponding plumage of that species. It is also smaller, unless compared with the small race bird distinguished as var. *floridanus*, which differs in colors and markings, as explained in the remarks respecting that form on page 113.

The *Scops McCallii* of Cassin seems to be the present form rather than what has been so called by most subsequent writers (*i. e.*, true *asio* and *S. trichopsis*?), the description corresponding exactly, while the habitat is nearly the same—*i. e.*, Texas and "Northern Mexico".

S. McCallii is described as follows:—

"In form and general appearance like the preceding, (*S. asio*), but *much smaller*; short and robust; wing with the fourth quill longest; tail short, slightly curved inwards; tarsi rather long, fully covered; toes partially covered with long hair-like feathers. ADULT. *Male*.—Much resembling in color the adult of the species immediately preceding, [*i. e.*, *S. asio*,] *but darker*; entire plumage above ashy brown, nearly every feather with a longitudinal stripe of brownish black, and with numerous irregular transverse lines and points of the same; under parts, ashy white, every feather with a longitudinal stripe of brownish black, and with well-defined *but irregular* transverse lines of the same; flanks and sides tinged with pale fulvous; quills brown, with several transverse bands of pale reddish-white, assuming the form of quadrangular spots on the outer webs, and pale reddish ashy on the inner webs; tail ashy brown, with about ten narrow transverse bands on all except the two central feathers, well-defined on the inner webs; scapular feathers and some of the greater coverts of the wings, edged with white; bill greenish horn-color, light yellowish at the tip; irides yellow.

"DIMENSIONS. Total length, $7\frac{1}{2}$ to 8 inches; wing, 6; tail, 3 inches. *Male*.

"HAB. Texas (Mr. Schott); Northern Mexico (Lieut. Couch). Spec. in Mus. Acad. Philada., and Nat. Mus., Washington City.

"OBS. This species very considerably resembles the adult or gray plumage of the *Scops asio*, but is uniformly *much smaller and darker*

in color. The transverse lines on the under surface of the body are better defined and more numerous."

In the above description, those characters which fit "*enano*", and not "*trichopsis*", I have taken the liberty to italicize.

In the "Birds of North America" (p. 53), a rufous specimen is described, which renders it still more certain that Cassin's *Scops McCallii* is the form which we have hitherto called "*enano*". The specimen there mentioned as in the National Museum from Florida is not this form, but has since been made the type of *S. asio* var. *floridanus*.*

—	Boston Soc.	Gray ad.	Guatemala .....	..... (?).....	5.60	3.30	.55	1.05	.70
—	S. & G.....	Gray ad.	San Bernardo, Guatemala.	Oct. —, 1862	5.70	3.10	.50	1.15	.75
—	do	Gray ad. ♂.	V. de Fuego, Guatemala.	Jan. —, 1874	5.90	3.35	.50	1.12	.75
—	do	Ruf. ad.	Dueñas, Guatemala.....	—, 1861	5.85	3.50	.50	1.05	.72
—	do	Gray juv.	Coban, Vera Paz.....	..... (1).....	5.60	3.25	.45	1.00	.70
—	G. N. L.....	Gray ad.	Mexico (?).....					

γ. kennicottii.

? *Scops asio*, COOP. & SUCKL., Pacific R. R. Rep. XII, ii, 1860, 155 (*Washington Terr.*).—LORD, Naturalist in Vancouver I., II, 1866, 292.

Scops kennicottii, ELLIOT, Pr. Ac. Nat. Sci. Phila. 1867, 69; Illustr. Birds Am. 1869, p. xxvii, pl. 11 (*Sitka, Alaska*; Märlb, 1866).—DALL & BANNIST., Tr. Chicago Acad. I, ii, 1869, 273 (do.).—BAIRD, *id.* 311, pl. xxvii (do.).—GRAY, Hand-l. I, 1869, 47, no. 492.—FINSCH, Abb. Nat. Brem. III, 1872, 28 (*Alaska*).—BOUC., Cat. Av. 1876, 91.

Scops asio var. *kennicottii*, RIDGW. in Cones' Key, 1872, 203.—COUES, Check List, 1873, 65, no. 318 a.—B. B. & R., Hist. N. Am. B., III, 1874, 48, 53 ("from Columbia River northward; Idaho").

Scops asio, b. *kennicottii*, COUES, Birds N. W. 1874, 303.

Scops asio, subsp. a. *Scops kennicottii*, SHARPE, Cat. Strig. Brit. Mus. 1875, 117 (*Vancouver I.*; "w. side Rocky Mts.").

Kennicott's Owl, AUCT., l. c.

Habitat.—The Northwest coast district, from Oregon to Sitka; Idaho; Vancouver Island (*Sharpe*); British Columbia (*Sharpe*).

DIAGNOSIS.—*Adult* (♂, 59,847, Sitka, Alaska, March, 1866; Ferd. Bischoff. Elliot's type):—Above umber-brown, with a slightly reddish cast; feathers confusedly mottled transversely with dusky, and showing rounded spots of rufous, most conspicuous on the nape; each feather with a conspicuous mesial, broad, ragged stripe of black, these stripes most conspicuous on the forehead and scapulars; outer webs of scapulars light rufous, bordered terminally with black. Wings of a more grayish cast than the back, but similarly variegated; lower feathers of the middle and secondary wing-coverts each with a large, oval, pale rufous spot, covering most of the lower web. Secondaries crossed by six narrow, obscure bands of pale rufous; primaries with seven, somewhat rounded, quadrate spots of the same on the outer webs, forming

* Since the above was put in type, I have seen, through the courtesy of Dr. E. Cones, a series of this species collected in Southern Texas (by Mr. G. B. Sennett), and consequently the true *S. maccallii*. They agree exactly with typical "*S. enano*", which fact therefore settles the question of the proper name of this form.

as many transverse series; each light spot with a central dusky mottling. Tail more finely and confusedly mottled than the wings; the bands, though present, so indistinct as to be scarcely traceable, and so irregular or badly defined as to be of uncertain number. Ear-tufts black and rusty, the former along the shafts, and in transverse spots; on the outer webs the black predominating, on the inner, the rusty.

Lores and basal half of the frontal bristles white, the terminal half abruptly black; eyebrows about equally blackish and paler, the former bordering the feathers; eye surrounded by dark snuff-brown; cheeks and ear-coverts pale rusty, transversely barred with deeper rusty; facial circle not well defined, black. Chin and lores only white.

Ground-color of the lower parts dilute-rusty, becoming white on the flanks; each feather of the throat, jugulum, breast, sides, and flanks with a broad mesial stripe of black, this throwing off very narrow, rather distant, bars to the edge; the spaces between these bars alternately paler and deeper dilute-rusty; the black marks broadest on the sides of the breast, where they have an external deep rusty suffusion; the abdomen medially and the anal region scarcely maculate rusty-white; the lower tail-coverts each with a central, cuneate, longitudinal stripe of black. Tibiæ, tarsi, and lining of the wing plain deep rusty. Wing-formula, $3 = 4, 5 - 2, 6 - 1 = 9$. Wing, 7.40; tail, 4.00; culmen, .65; tarsus, 1.50; middle toe, .80.

No. 59,068 (Idaho; Dr. Whitehead), is considerably darker than the type, the ground-color above approaching snuff-brown; it differs, however, in no other respect as regards coloration; the size (as might be expected) is considerably smaller, measurements being as follows: Wing, 6.80; tail, 3.50; culmen, .60; tarsus, 1.20; middle toe, .80. Wing-formula the same as in type.

No. 4,530 (Washington Territory; Dr. Geo. Suckley) is just intermediate, in all respects, between typical *kennicotti* and *asio*, being referable to either with equal propriety, though perhaps inclining rather more to the former.

A very obvious character of this race is the smaller size, more quadrate form, and more rufous color, of the spots on the primaries, and the greater indistinctness of the bands on the tail; but this is merely in consequence of the greater extension of the brown markings, thus necessarily contracting the lighter spots. In these respects only, does the Washington Territory specimen differ from the two typical examples before me, having the larger, more whitish spots on the primaries, and more distinct bands on the tail, as in *asio*.

There is a wonderfully close resemblance in general aspect between this form of *Scops asio* and *S. semitorques* (Schleg.) of Japan, caused by the exceeding similarity in size, form, and coloration, both as regards tints and pattern. Indeed, the only very obvious difference consists in the distinctly white jugulum and well-defined lighter occipital and nuchal collars of *semitorques*, which has also the pencillings of the

lower surface narrower or more delicate. The differences between the two may be tabulated as follows:—

S. SEMITORQUES.*—A well-defined nuchal collar, of mottled pale ochraceous; jugulum immaculate white centrally. Feathers of the lower parts with their transverse pencillings growing fainter toward the middle line, which is unvariegated white from the central jugular spot to the anal region. Wing, 6.60–7.25; tail, 3.60–3.85; culmen, .60; tarsus, 1.25–1.40; middle toe, .80–.90. *Hab.*, Japan.

S. KENNICOTTI.—No well-defined nuchal band; jugulum closely barred centrally; feathers of the lower parts with their transverse pencillings not growing fainter toward the middle line, which is unvariegated white only on the abdominal portion; the medial black streaks to the feathers of the lower surface much broader, and transverse pencillings rather coarser. Wing, 6.90–7.30; tail, 3.50–4.50; culmen, .60–.65; tarsus, 1.35–1.45; middle toe, .80–.90. *Hab.*, North Pacific coast of North America from Sitka to Washington Territory, and Western Idaho.

δ. floridanus.

"*Scops asio*", ALLEN, Bull. M. C. Z. II, 1871, 338.

Scops asio var. *floridanus*, RIDGW., Bull. Essex Inst. V, Dec. 1873, 200 (*Indian R., Florida*); in B. B. & R., Hist. N. Am. B. III, 1874, 48, 51.

Scops asio, subsp. *β. Scops floridanus*, SHARPE, Cat. Strig. Brit. Mus. 1875, 118.

Scops floridanus, BOUC., Cat. Av. 1876, 91.

Habitat.—Florida and Lower Georgia.

DIAGNOSIS.—Similar to var. *asio*, but much smaller, and the colors deeper. The gray stage very similar to that of var. *asio*, but the red phase very appreciably different, there being a greater amount of rufous on the lower parts, the breast nearly uniformly colored, and the rufous broken elsewhere into transverse broad bars, connected along the shaft. Wing, 5.50–6.00; tail, 2.75–3.10.

This extreme Southern form is much smaller than the more Northern ones, being about the same in size as *S. maccalli* of Guatemala and Eastern Mexico, and *S. cassini*, also from the latter country. The colors are also darker and richer.

In the collection of the National Museum are two specimens of this race, one in each phase of plumage. The red one (No. 5,857, Indian River) measures, wing, 5.50; tail, 2.70; culmen, .55; tarsus, 1.05; middle toe, .65. The colors are much darker than those of Northern and Western specimens; the rufous of the neck, all round, shows indistinct, darker, transverse bars; the black border to the white scapular spots is restricted to the tip of the feathers; the inner webs of the ear-tuft feathers are scarcely paler than the outer; the neck and face are deeper rufous, while on the lower parts this color predominates, and is disposed chiefly in transverse rays; and the tibiae and tarsi are plain rufous. Only the middle of the abdomen and the anal region are pure white.

* *Otus semitorques*, SCHLEG., Fauna Japon. Aves, 1845, 25, pl. 8.

Scops semitorques, BONAP., Consp. I, 1850, 46.—SHARPE, Cat. Strig. Brit. Mus. 1875, 83.

e. maxwellii.

"*Scops asio*", RIDGW., Bull. Essex Inst. Nov. 1873, 185 (*Colorado*).

Scops asio, *e. maxwellii*, RIDGW., Field and Forest, June, 1877, 210, 213 (*Boulder Co., Colorado*; resident; breeding).

Mrs. Maxwell's Owl, RIDGW., l. c.

Habitat.—Mountains of Colorado (Boulder Co.; resident and breeding; *Mrs. Maxwell*).

DIAGNOSIS.—Ground-color above pale gray or grayish-brown, relieved by the usual ragged mesial streaks of black, and irregular mottlings and vermiculations of lighter and darker shades. The ground-color, however, never inclining strongly to reddish, and not darker in shade than a very light ash-gray or brown. The white spots on outer webs of the primaries *frequently confluent*, the darker spots, in extreme cases, being hardly visible on the basal portion of the quills when the wing is closed. Face grayish-white, with faint vermiculations of darker grayish. *No rusty gular collar*, but in its stead sparse, narrow bars of brown or rusty on a white ground. Wing, 6.80–6.90; tail, 3.90–4.10; culmen, .60; tarsus, 1.45–1.50; middle toe, .80–.85.

The characteristics of this form are remarkably constant, a series of a dozen or more specimens affording no instance of notable variation.

6. SCOPS TRICHOPSIS?

?*Scops trichopsis*, WAGL., Isis, 1832, 276 (*Mexico*).—BONAP., Consp. I, 1850, 46.—STRICKL., Orn. Syn. I, 1855, 201.—SALVIN, Ibis, 1874, 314.—BOUC., Cat. Av. 1876, 91 (*Mexico*).

Ephialites trichopsis, GRAY, Genera B. I, 1844, 38.

Megascops trichopsis, KAUP, Trans. Zool. Soc. Lond. IV, 1862, 227.

Asio trichopsis, BONAP., Rev. et Mag. de Zool. 1854, 543.

Scops asio, subsp. *δ. Scops trichopsis*, SHARPE, Cat. Strig. Brit. Mus. 1874, 119 (*W. Mexico*).

"*Ephialites choliba*", LAWR., Ann. Lyc. N. Y. VI, 1853, 4 (*see Vieill.*).

Scops asio var. *maccalli*, COUES, Key, 1872, 203; Check List, 1873, 65, no. 318 *b*.—RIDGW., in B. B. & R. III, 1874, 49, 52.

Habitat.—Western Mexico, and the extreme southwestern portion of the United States (Texas; *Cassin*. New Mexico; *Nat. Mus.* Stockton, Cal.; *Mus. G. N. Lawrence*.)

DIAGNOSIS.—*Adult* (No. 9,147, New Mexico, Feb. 10, 1854; Kennerly and Möllhausen):—Above light ash-gray, minutely vermiculated with dusky and grayish-white, each feather with a distinct mesial stripe of blackish, showing in strong relief; these stripes broadest on the forehead. Outer webs of the exterior row of scapulars white, without black terminal borders; outer webs of two or three lower, middle, and greater wing coverts also white; outer webs of primaries marked with transverse series of white spots, these forming about eight bands across the larger quills. Tail crossed by about eight narrow, pale bands. Ear-coverts, cheeks, throat, and jugulum finely and uniformly barred transversely, or vermiculated, with dusky and grayish-white; the facial circle interrupted across the throat, where, in its place, is a series of

longitudinal, black dashes. Lower parts grayish-white, with numerous, very narrow, transverse bars of dusky, each feather with a mesial stripe of black, these stripes forming on the breast conspicuous spots; tibiae and tarsi dull soiled-white, spotted with dark brown; crissum immaculate white. Wing, 6.50; tail, 3.30; culmen, .55; tarsus, 1.15; middle toe, .70.

Young, in down, but nearly full-grown (No. 16,932, Cape St. Lucas, Lower California; J. Xantus):—Remiges and rectrices as in the adult. Rest of the plumage, above and below, including the head, narrowly barred with dusky and grayish-white, the former predominating above, the latter prevailing below; eyebrows and lores white; wing-coverts finely mottled transversely with dusky and white, the latter forming spots on the lower feathers; tibiae and tarsi with numerous dusky bars.

REMARKS.—An adult from Stockton, California (E. S. Holden), kindly loaned me by Mr. Geo. N. Lawrence, and the only United States example, besides the one described above, that I have seen, differs from the specimen from New Mexico in having the general tint of the plumage rather more brownish, and the mesial blackish streaks of the upper parts less distinct. It measures, wing, 6.20; tail, 3.10.

The form of *Scops-owl* represented by the specimens described above, as well as by those from which Mr. Sharpe's descriptions are drawn, is certainly to be distinguished from the several styles of *S. asio* treated in the foregoing pages; but whether it is a distinct species, or merely another geographical race of *asio*, cannot be decided without additional material. For the present, however, I keep it separate, on account of the different pattern of the markings on the lower plumage, which in *S. asio* is exactly the same in all the several races.

There is also considerable doubt as to the name this form should bear. Wagler (*l. c.*) describes an owl from Mexico which may be this bird, but the only pertinent character which I am able to glean from his description is that the toes are bristled; it is, therefore, either this bird or one of the forms of *asio*; but in identifying the *Scops trichopsis* of Wagler with the bird under consideration, I merely adopt the determination of that name as made by Messrs. Sclater and Salvin, and, subsequently, by Mr. Sharpe.

That this is the bird which Mr. Sharpe describes as *Scops asio*, "subsp. *δ. Scops trichopsis*" (*l. c.*), there can be no doubt, his description fitting perfectly the example described above, while his additional remarks on pp. 120, 121, show that he fully appreciated the character of the differences between it and true *asio*. We transcribe Mr. Sharpe's remarks:—

"*Obs.* This is a small race of *S. kennicotti* [*qu. lapsus calam. for asio?*]; but, as far as can be determined, it has only a grey phase and no brown one. Its measurements distinguish it at once; and it may also be told by its narrowly barred under surface, every feather being streaked with black, and barred with the same, from the chin to the

lower abdomen and flanks. It is larger than *Scops enano* [*i. e.*, *maccalli*], and differs from that bird also in not having a rufous phase; the cross-barring of the under surface in the latter is of the same character in *S. enano* as in *S. asio*; that is to say, the bars are often double, whereas in *S. trichopsis* they are single and very distinct."

The specimens in the British Museum, two in number, are both from Western Mexico; and it would seem that the species is mainly confined to the Pacific slope of that country, though ranging sparingly into the Southwestern United States, where, however, true *S. asio* is much more common.

7. SCOPS COOPERI.

Scops cooperi, RIDGWAY, MS.

Habitat.—Costa Rica.

SP. CH.—Very similar to the grayish style of *S. brasiliensis*, but with the toes very distinctly bristled.

♀ *ad.* (No. 74,207, Santa Ana, Costa Rica, Sept. 4, 1875, José C. Zeledón):—Above grayish umber-brown, very finely vermiculated with dusky, the feathers of the pileum and back having mesial, chain-like streaks of blackish; outer webs of exterior scapulars somewhat varied with white spotting; outer webs of primaries marked with quadrate spots of pale fulvous, bordered with blackish, there being about ten of these spots on the longest quill (the fifth); tail crossed with narrow bands of the same color, likewise bordered with a narrower dusky bar, these light bands about 10–12 in number. Face brownish-white, finely but distinctly barred with dusky brown; superciliary region lighter and more coarsely mottled; face bordered laterally or posteriorly by a distinct narrow band of dusky spots. Lower parts white, densely marked with blackish and umber-brown zigzags, imparting a light brownish appearance to the whole surface; feathers of the tibiae and tarsi light rusty-umber, thickly barred with deeper brown. "Iris lemon-yellow; cere, bill and feet, yellowish green." Wing, 7.00; tail, 3.75; culmen, .62; tarsus, 1.25; middle toe, 1.00.

♀ *juv.* (No. 74,552, San José, Costa Rica, May 10, 1866; José C. Zeledón):—*Toes distinctly bristled*, excepting on the two or three terminal scutellæ. General color above light grayish-brown, relieved by very minute and rather indistinct, transverse vermiculations of dusky, and larger, but still inconspicuous, transverse marks of white, these larger and more obvious on the lower webs of the middle wing-coverts. Remiges and rectrices pale grayish-brown, minutely vermiculated with dusky, and distinctly banded with pale reddish-fulvous (color of sulphate of manganese). Lower parts dirty-whitish, crossed *everywhere* with transverse vermiculations, or ragged, narrow lines of dusky, strongly suffused with brownish across the jugulum, where the vermiculations are minute and confused; flanks and crissum with the bars broad and distinct, the interspaces nearly pure white, and wider than the mottled brownish bars. Bill pale horn-color, yellowish at the end; "iris yellow"; claws very

pale horn-color, darker terminally. Culmen, .60; tarsus, 1.30; middle toe, .88*

REMARKS.—It is very difficult to express, by a mere description, the points of difference in coloration between this new species and the grayish phase of *Scops brasiliensis*. Specimens of the latter, collected in Costa Rica, by Mr. Zeledon, are hardly appreciably different at a casual glance. Upon close comparison, however, it may readily be seen that the lower parts of *S. cooperi* are much more densely vermiculated,† the legs much more rufescent and more distinctly barred, the white variegation of the outer scapulars far less conspicuous, and the light bars on the remiges and rectrices narrower and more numerous. Compared with one of these specimens of *S. brasiliensis*, having the wing the same length (7.00 inches), it is found that the tail of *S. cooperi* is much shorter, its length being only 3.75 instead of 4.25; this shortness of the tail in the present species causes the legs to appear proportionately longer, the claws reaching considerably beyond the end of the tail, while in *S. brasiliensis* they do not reach to within half an inch of the tip. This greater elongation of the legs is not merely apparent, however, the tarsi being absolutely longer and the toes both longer and stouter; the claws in particular are decidedly stronger than in *S. brasiliensis*.

It is not necessary, however, to make a minute comparison of markings and proportions in order to distinguish between these two species, the single character of the toes, being strongly bristled in *S. cooperi* and absolutely naked in *S. brasiliensis*, being sufficient for the purpose. *S. cooperi* is, moreover, the only bristly-toed member of this genus found south of Guatemala, so there is no need of confounding it with any other species of the same group.

I have named this species, at the request of Mr. Zeledon, the collector of the type-specimens, after Mr. Juan Cooper, of Cartago, Costa Rica, a particular friend of his, to whom he is much indebted for many interesting contributions to his collections.

* Being a very young bird, and the remiges and rectrices but partly developed, measurements of the wing and tail would of course be of no value.

†Not more so, however, than in some specimens typical of the var. *guatemalæ*, Sharpe.

NOTES ON THE ORNITHOLOGY OF SOUTHERN TEXAS, BEING A LIST OF BIRDS OBSERVED IN THE VICINITY OF FORT BROWN, TEXAS, FROM FEBRUARY, 1876, TO JUNE, 1878.

By JAMES C. MERRILL, Assistant Surgeon U. S. Army.

The post of Fort Brown, Texas, in the immediate vicinity of which most of the following observations were made, is at the extreme southern point of the State, in latitude $25^{\circ} 53' 16''$, longitude $97^{\circ} 13'$. It adjoins the town of Brownsville, on the left bank of the Rio Grande, and across the river is Matamoras, in the Mexican State of Tamaulipas. The nearest part of the Gulf coast is about eighteen miles distant. The surrounding country is level, and mostly covered with low chaparral; towards the coast this becomes more sparse, and gives place to extensive prairies, broken by shallow, brackish lagoons and sand ridges, with a scanty growth of cactus and yucca. The average annual temperature is about 73° Fahrenheit; snow and ice are unknown, and slight frosts are rare. But little rain falls from March to September. This region offers an excellent field for the ornithologist. Besides a very large number of northern migrants that either remain throughout the winter or pass farther south, there are many forms characteristic of the river valley, and other Mexican species, either regular summer visitors or stragglers that are new to the United States fauna. A number of the latter class were obtained within our limits for the first time,* and others by Mr. G. B. Sennett; but there are doubtless many more yet to be found.†

Of the localities mentioned in this list, Brazos and Padre Islands are the parts of the Gulf coast nearest the fort; they are long, narrow sand ridges, almost destitute of vegetation. A similar formation is seen in the outer beach on the south shore of Long Island. Santa Maria and Edinburgh (now Hidalgo) are on the river, about twenty-eight and sixty miles respectively above the fort by road. Here the character of the country changes; the trees are much higher, and near the last-named settlement the land begins to rise. The avifauna, too, is somewhat different, and three species‡ in particular stop abruptly there. As a matter of local interest, an asterisk is prefixed to those species that are known to breed within the limits of the fort and government reservation.

* *Thryothorus ludovicianus* var. *berlandieri*, *Vireosylva flavoviridis*, *Cyanospiza versicolor*, *Myiarchus erythrocerus* var. *cooperi*, *Amazilia fuscicaudata*, *A. yucatanensis*, *Nyctidromus albicollis*, *Sturnella magna* var. *mexicana*, *Molothrus aeneus*, *Buteo albicaudatus*, *Parra gymnostoma*, and *Podiceps dominicus*.

† Several species of Parrots are found about Vittoria, ninety miles south of Fort Brown, some of which must occasionally cross the Rio Grande. During the summer of 1877, two specimens of a Trogon were killed north of the river, one near Ringgold Barracks, the second at Las Cuevas, some miles lower down. They were described to me by the persons who shot them, but unfortunately they were not preserved. [Undoubtedly *T. ambiguus*, Gould.—R. R.]

‡ *Campylorhynchus brunneicapillus*, *Auriparus flaviceps*, and *Callipepla squamata*.

I desire to express my indebtedness to Dr. T. M. Brewer and Mr. R. Ridgway for their assistance in many ways, and for their notes, which add so much to the value of the present paper.

1. *Turdus fuscescens*, Stephens.

January 1, 1877.

2. *Turdus migratorius*, Linn.

Occurs rather sparingly during the winter months.—(DRESSER, Ibis, 1865, 475.)

3. **Harporhynchus rufus* var. *longirostris*, (Laf.)

This fine songster is a common resident, frequenting shady thickets and rarely seen in the open. In habits, it scarcely differs from the Eastern var. *rufus*, and the large number of nests found here were quite as well built as those found in New England. The usual number of eggs is three, often two, more rarely four: the ground-color varies from greenish to reddish-white, more or less thickly sprinkled with reddish and brownish dots and spots. One set is sparingly covered with large clouded blotches, giving the eggs an appearance unusual in this genus. Fifty-two eggs average 1.08 by .82, the extremes being 1.13 by .86 and .97 by .75. In some adult specimens, there is a decided tendency to whitish tips to the outer tail-feathers, as in var. *rufus*.—(*H. rufus longirostris*, SENNETT, B. Rio Grande, 3.)

4. **Harporhynchus curvirostris*, (Swains.)

This Thrush is about as common as the preceding species, and is resident. They are not often seen together, however, as this bird prefers more open and sunny localities, especially sparse chaparral, where the prickly pear grows. Here it passes much of its time on the ground, running rapidly about in search of small land-shells and insects. I cannot confirm the praises of the song of this bird given by Couch and Heermann: it seems to me to be one of the most silent of the song Thrushes. Its alarm note is a sharp *whit-whit*. The nests are usually placed among the fleshy joints of the prickly pear, or in some of the many thorny and almost impenetrable bushes found in Southern Texas: they are often seen in the dense prickly hedges that surround most Mexican *jacals*. They are, as a rule, readily distinguishable from those of the Texas Thrasher and Mocking-bird by the almost invariable lining of yellow straws, giving a peculiar appearance to the nest. They are also more compactly built, are well cupped, and often have the edges well guarded by thorny twigs. The eggs are usually four in number: the ground-color is a deep greenish-blue (more rarely pale yellowish), rather sparsely sprinkled over the entire surface with very fine brown dots. They average 1.13 × .80: extremes 1.18 × .83 and .94 × .72.—(DRESSER, Ibis, 1865, 482.—SENNETT, B. Rio Grande, 4.)

5. **Mimus polyglottus*, (Linn.)

A very common resident. By the 20th of May, many pairs have eggs

of the second brood.—(DRESSER, Ibis, 1865, 481.—SENNETT, B. Rio Grande, 3.)

6. *Galeoscoptes carolinensis*, (Linn.)

A few seen during the migrations: some pass the winter here.

7. *Sialia sialis*, (Linn.)

Uncommon. Two pairs, seen at Edinburgh in May, 1876, were undoubtedly breeding.—(DRESSER, Ibis, 1865, 475.—SENNETT, B. Rio Grande, 6.)

8. *Regulus calendula*, (Linn.)

Found in some abundance from November to March.—(DRESSER, Ibis, 1865, 476.)

9. *Poliophtila cærulea*, (Linn.)

Abundant during the migrations, a few passing the winter and a considerable number remaining to breed. A nest taken April 24, 1877, was placed on a dead lichen-covered branch of an ebony-bush about six feet from the ground. It was supported by three upright twigs, and was so well concealed that I did not notice it till the female flew off, though I had been standing with my head within a foot of it. It contained five eggs that would have hatched within a few days.—(DRESSER, Ibis, 1865, 485.—SENNETT, B. Rio Grande, 6.)

10. **Lophophanes atricristatus*, Cassin.

A common resident. The usual notes of the species are like those of the Eastern Chickadee: it has, in addition, a loud whistling song, much like that of the Cardinal. A nest found near Edinburgh, April 26, 1876, was in a decayed branch, about fifteen feet from the ground, and contained six nearly fledged young: the males had well-developed crests. The nest proper was composed of various soft materials like that of *Parus atricapillus*. About four weeks later, the same pair were making preparations for a second brood in an old *Picus scalaris* excavation just above my tent, but I was obliged to leave before any eggs were laid. A nest found about the middle of May of the following year was, I am confident, of this species. It was in a vertical hole in a stump, enabling the five eggs to be plainly seen: these seemed somewhat larger than eggs of *P. atricapillus*, but otherwise were similar. As the parents were not seen, I left, intending to return in a short time, but was prevented from doing so for several days, when the eggs had been destroyed by some animal. Another nest, found April 18, 1878, was placed in a deep crack in the trunk of a tree: it contained several young.—(DRESSER, Ibis, 1865, 485.—SENNETT, B. Rio Grande, 6.)

NOTE.—An unidentified egg from Matamoras, but not distinguishable from one identified by Mr. Sennett as of this species, measures .62 by .48, is of an oval shape, has a white ground finely sprinkled over with purplish-brown dots. These are more abundant about the larger end, and form a ring around the latter. Fine, indistinct shell markings give a purplish cast to the ground, which is, however, of a pure white.—T. M. B.

11. *Auriparus flaviceps*, (Sund.).

I have not observed this species in the immediate vicinity of Fort Brown, but it was rather common at Edinburgh in April and May, frequenting mostly amargosa chaparral. Several of its curious nests were found placed on horizontal branches of ebony and amargosa bushes about five feet from the ground. The outside was composed of thorny twigs well interlaced: the inside was warmly lined with fur and feathers. The entrance was at one side, barely large enough to admit the bird, and somewhat projecting, giving the entire nest an oval shape. The birds were excessively shy, and were obtained with difficulty.—(SENNETT, B. Rio Grande, 6.)

12. * *Thryothorus ludovicianus* var. *berlandieri*, Couch.

A rather common resident, and found in all situations: Its song and habits are probably not different from those of the Great Carolina Wren. Although several pairs breed each year within the fort, I did not succeed in finding their nests, which I think were placed in some thick brush piles and fences. At least two broods are raised, and the scarcely fledged young show the characteristic rufous of the under parts. A set of four eggs of this variety now before me, taken near Edinburgh in an old Woodpecker's excavation, average $.73 \times .54$. In three, the ground-color is white with a reddish tinge, thickly dotted with reddish and pale lilac, especially at the larger end. The fourth has the ground-color a warm reddish, like many eggs of the House Wren. A young brood frequented a pile of brush near camp at Edinburgh: they were very tame, coming into my tent and examining its contents with the greatest interest, not minding my presence in the least. The notes are loud and varied, but I am not able to say how much they may differ from those of var. *ludovicianus*.—(*T. ludovicianus berlandieri*, SENNETT, B. Rio Grande, 8.)

13. * *Thryomanes bewicki* var. *leucogaster*, Baird.

Thryothorus bewicki, SCL., P. Z. S. 1859, 372 (Oaxaca); Catal. 1861, 22, No. 141 (part).—SCL. & SALV., Nom. Neotr. 1873, 7, No. 11 (Mexico).—COUES & SENNETT, Bull. U. S. Geol. and Geog. Survey Terr. vol. iv, No. 1, Feb. 1878, 9 (Brownsville and Hidalgo, Texas).*

Thryothorus bewicki var. *leucogaster*, BAIRD, Review, 1864 127 (San Antonio and Ringgold Barracks, Texas; Sta. Rosalia, Tamaulipas, and New Leon, Mexico).

* Mr. Sennett's specimens having been compared with the extensive series, embracing the several races of this species, in the National Museum collection, prove to be the var. *leucogaster* of Baird, and not the true *bewicki*. The National Museum possesses two specimens of the latter from Waller County and Brazos, Texas, but none from the Rio Grande, where probably only the var. *leucogaster* occurs, while it also probably does not penetrate farther into the State. The two specimens of true *bewicki* alluded to above were captured December 13 and 14, 1876, and were perhaps merely winter visitors. They are absolutely typical of the race, and, when compared with Mr. Sennett's specimens, the great difference in coloring is at once apparent.—R. R.

A common resident about Fort Brown, but fifty or sixty miles higher up the river it becomes less abundant. Few birds have a greater variety of notes than this species, and I have frequently been led by a strange song through dense chaparral only to find this little bird perched upon the topmost twig of an amargosa bush apparently enjoying my disappointment. Their principal song is much like that of the Song Sparrow, but sweeter. It probably raises three broods, as I have seen it leading fully fledged young as early as March 27. Its nests are placed in a variety of situations. I have found them in an old Woodpecker's nest, placed between three or four joints of the prickly pear, forming a bulky structure, and among the twigs of various dense thorny bushes. A set of six eggs, now before me, average $.68 \times .50$. I have no eggs of var. *bewickii* at hand with which to compare them. A second set of five, taken on the 2d of May from a nest among the joints of a cactus, are smaller than the preceding, averaging $.62 \times .50$; the markings are much fainter and finer, and the two sets are quite different in appearance. Three other sets taken subsequently vary greatly in size and markings. In some, the latter are very fine and inconspicuous; in others, there are heavy markings of reddish and lilac. Thirty eggs average $.63$ by $.45$, the extremes being $.70$ by $.52$ and $.60$ by $.46$.

NOTE.—The eggs of *T. leucogaster*, as compared with those of *bewickii* and *spilurus*, exhibit many points in common, and do not vary more than the eggs of the same species are often found to differ. Nine eggs of the Texan form, *leucogaster*, are, in size, a trifle the largest, and all of them are much more deeply marked with larger and more confluent blotches of reddish-brown. In size, six eggs of *bewickii*, from Mount Carmel, Ill., collected by Mr. Ridgway, are not quite equal to *leucogaster* and a little less strongly marked, the spots being nowhere confluent. Five eggs of *spilurus* from California are still less in size, and their markings are smaller, fewer, and of a lighter color, one being of an almost immaculate white.—T. M. B.

14. *Troglodytes aëdon*, Vieill.

Rather uncommon during the winter months.

15. *Troglodytes aëdon* var. *parkmanni*, Aud.

A single specimen of this variety was taken in the autumn of 1877.

16. *Telmatodytes palustris*, (Wils.)

One obtained December 16, 1876.

17. *Anthus ludovicianus*, (Gmel.)

Very abundant from October to March. I have seen a few as late as April 28.—(DRESSER, Ibis, 1865, 476.)

18. *Mniotilta varia*, (Linn.)

Common during the migrations; a good many pass the winter.—(DRESSER, Ibis, 1865, 476.)

19. *Helminthophaga chrysoptera*, (Linn.)

Several specimens taken in the spring.—(DRESSER, Ibis, 1865, 478.)

20. *Helminthophaga pinus*, (Linn.)

One specimen taken at Edinburgh (Hidalgo) in May.

21. *Helminthophaga ruficapilla*, (Wils.)

A male obtained in April approaches the supposed "var. *ocularis*" in the restriction of the yellow of throat.—(DRESSER, Ibis, 1865, 478.—SENNETT, B. Rio Grande, 12.)

22. *Helminthophaga celata*, (Say.)

Rather common during the colder months.—(DRESSER, Ibis, 1865, 478.—SENNETT, B. Rio Grande, 12.)

23. *Helminthophaga peregrina*, (Wils.)

Less common than the preceding.

24. *Parula americana*, (Linn.)

Occurs during the migrations.—(DRESSER, Ibis, 1865, 476.—SENNETT, B. Rio Grande, 11.)

25. *Parula nigrilora*, Coues.

Arrives about the third week in March, and passes the summer among thick woods and near the edges of lagoons where there is Spanish moss. Here they are quite common, and their song is constantly heard. A nest found July 5, 1877, was in a small bunch of the moss about eight feet from the ground: with the exception of four or five horse-hairs, there was no lining. It contained three young.—(COUES & SENNETT, Bull. U. S. Geol. Surv. Terr. vol. iv, Feb. 5, 1878, 11.)

26. *Dendrœca æstiva*, (Gmel.)

Not uncommon during the migrations.—(DRESSER, Ibis, 1865, 478.)

27. *Dendrœca coronata*, (Linn.)

This is perhaps the most common of the winter residents, and is found in the greatest abundance from the latter part of October to April. About the latter part of March, there is an arrival of males from the south in nearly full breeding plumage.—(DRESSER, Ibis, 1865, 478.—SENNETT, B. Rio Grande, 13.)

28. *Dendrœca maculosa*, (Gmel.)

Rather rare in the spring.—(DRESSER, Ibis, 1865, 478.)

29. *Dendrœca blackburniæ*, (Gmel.)

A female taken May 3 at Edinburgh.—(DRESSER, Ibis, 1865, 478.)

30. *Dendrœca dominica* var. *albilora*, Ridg.

One of the first migrants to return in the autumn, when it is not rare.

A few pass the winter.—(*D. superciliosa*, DRESSER, Ibis, 1865, 478.—*D. dominica albilora*, SENNETT, B. Rio Grande, 13.)

31. *Dendroeca pennsylvanica*, (Linn.)

Several seen in April and May.

32. *Dendroeca striata*, (Forst.)

A single specimen taken in August.

33. *Dendroeca castanea*, (Wils.)

Not rare in the spring migration.—(DRESSER, Ibis, 1865, 478.)

34. *Dendroeca virens*, (Gmel.)

Taken in May and November.—(DRESSER, Ibis, 1865, 477.—SENNETT, B. Rio Grande, 13.)

35. *Siurus nævius*, (Bodd.)

Rather common in the spring and fall.—(*S. noveboracensis*, DRESSER, Ibis, 1865, 477.)

36. *Siurus motacilla*, (Vieill.)

March 31, 1877.—(SENNETT, B. Rio Grande, 13.)

37. **Geothlypis trichas*, (Linn.)

Found throughout the year. Summer birds approach var. *melanops*, and are perhaps referable to that variety.—(DRESSER, Ibis, 1865, 476.)

38. *Geothlypis philadelphia*, (Wils.)

A female taken within the fort on September 7, 1877.—(DRESSER, Ibis, 1865, 476.)

39. **Icteria virens*, (Linn.)

A common summer resident, arriving at Fort Brown about March 26. Here it is much more common than higher up the river. Individuals breeding in Southern Texas are decidedly smaller than those taken in New England, bearing about the same relation to them that *Icterus* var. *affinis* does to var. *spurius*. Thirty-three eggs average $.87 \times .64$.—(SENNETT, B. Rio Grande, 13.)

40. *Myiodioides mitratus*, (Gmel.)

Several specimens taken in April, 1876.—(DRESSER, Ibis, 1865, 478.)

41. *Myiodioides pusillus*, (Wils.)

Abundant during the migrations, returning in autumn about the 10th of August.—(DRESSER, Ibis, 1865, 478.)

42. *Myiodioides canadensis*, (Linn.)

May 2, 1877.—(DRESSER, Ibis, 1865, 478.)

43. *Setophaga ruticilla*, (Linn.)

Not rare in spring and fall.—(DRESSER, Ibis, 1865, 479.—SENNETT, B. Rio Grande, 14.)

44. *Progne subis*, (Linn.)

Occurs during the migrations. I have seen them as early as January 20.—(*P. purpurea*, DRESSER, Ibis, 1865, 479.)

45. *Petrochelidon lunifrons*, (Say.)

Very common from early in April until the latter part of August. It is one of the most abundant of the summer visitors, and is the only Swallow that breeds here. I have not been able to detect *P. swainsoni*, Sel., of Mexico.—(SENNETT, B. Rio Grande, 15.—*Hirundo l.*, DRESSER, Ibis, 1865, 479.)

46. *Hirundo erythrogaster* var. *horreorum*, Barton.

The latest Swallow to arrive in the spring and the earliest to return in the autumn; first seen about April 12, or earlier, and August 9.—(*H. horreorum*, DRESSER, Ibis, 1865, 479.—SENNETT, B. Rio Grande, 15.)

47. *Tachycineta bicolor*, (Vieill.)

Common during the migrations. Some of this species must pass the winter at no great distance from here, as I have frequently seen small flocks in November, December, and January, after a few warm days.—(SENNETT, B. Rio Grande, 15.)

48. *Cotyle riparia*, (Linn.)

Not rare during the migrations. One of the latest Swallows to return in the autumn.—(DRESSER, Ibis, 1865, 479.)

49. *Vireosylvia olivacea*, (Linn.)

May.—(*Vireo o.*, DRESSER, Ibis, 1865, 480.—SENNETT, B. Rio Grande, 16.)

50. *Vireosylvia flavoviridis*, Cassin.

Vireosylvia flavoviridis, CASSIN, Pr. Phila. Acad. V, Feb. 1851, 152; VI, pl. ii (Panama).—SCL., P. Z. S. 1856, 298 (Cordova); 1859, 375 (Oaxaca; April); Catal. 1862, 44, No. 264 (Guatemala).—SCL. & SALV., Ibis, I, 1859, 12 (Guatemala); Nom. Neotr. 1873, 11, No. 3 (Mexico to Panama).—BAIRD, Review, May, 1866, 336 (Monterey, Mazatlan, and Rosario, near Colima, Mexico; San José, Costa Rica; Isth. Panama).—SUMICHRIST, Mem. Boston Soc. I, 1869, 547 (Orizaba; Alpine Reg.).—BOUCARD, Cat. 1876, 215, No. 6665 ("N. America").

Vireo flavoviridis, BAIRD, B. N. Am. 1858, 332.

Phyllomanes flavoviridis, CABAN., Journ. 1861, 93 (Costa Rica).

A single specimen, a male, taken within the fort, August 23, 1877.

51. *Vireosylvia gilva*, (Vieill.)

October 2, 1877.—(*Vireo gilvus*, DRESSER, Ibis, 1865, 480.)

52. *Lanivireo solitarius*, (Wils.)

August 23, 1877.—(*Vireo s.*, DRESSER, Ibis, 1865, 481.)

53. **Vireo noveboracensis*, (Gmel.)

A common resident, breeding abundantly.—(DRESSER, Ibis, 1865, 481.—SENNETT, B. Rio Grande, 16.)

54. *Vireo belli*, Aud.

A single specimen taken.—(DRESSER, *Ibis*, 1865, 481.—SENNETT, B. Rio Grande, 16.)

55. *Ampelis cedrorum*, (Vieill.)

Seen in small flocks during the migrations; doubtless pass the winter here.—(DRESSER, *Ibis*, 1865, 480.—SENNETT, B. Rio Grande, 16.)

56. *Collurio ludovicianus* var. *excubitoroides*, (Swains.)

Abundant from about the first of September until April. I do not think that any remain to breed.—(*C. ludovicianus excubitorides*, SENNETT, B. Rio Grande, 16.—*Collyrio ludovicianus*, DRESSER, *Ibis*, 1865, 480.)

57. **Pyranga æstiva*, (Gmel.)

Not rare during the migrations; a few remain here all summer.—(DRESSER, *Ibis*, 1865, 479.—SENNETT, B. Rio Grande, 14.)

58. *Chrysomitris tristis*, (Linn.)

Not rare during the winter months.—(DRESSER, *Ibis*, 1865, 479.)

59. *Passerculus savanna* var. *alaudinus*, Bon.

February.—(*P. alaudinus*, DRESSER, *Ibis*, 1865, 487.)

60. *Poocetes gramineus* var. *confinis*, Baird.

Spring and autumn.—(*P. gramineus*, DRESSER, *Ibis*, 1865, 487.—*P. gramineus confinis*, SENNETT, B. Rio Grande, 17.)

61. *Coturniculus passerinus*, (Wils.)

January.—(DRESSER, *Ibis*, 1865, 487.)

62. *Chondestes grammica*, (Say.)

This species is most abundant during the migrations in April and September; but a few pass the winter, and some remain to breed. In this vicinity, they appear to build indifferently on the ground or in bushes. When in the latter situation, the nest externally is rather bulky, but is neatly finished inside with hairs and rootlets.—(DRESSER, *Ibis*, 1865, 488.—SENNETT, B. Rio Grande, 19.)

63. *Zonotrichia leucophrys*, (Forst.)

Abundant during the colder months.—(SENNETT, B. Rio Grande, 19.)

64. *Zonotrichia intermedia*, Ridg.

This variety seems to be about as common during winter as the preceding.—(*Z. gambeli*, DRESSER, *Ibis*, 1865, 488.)

65. *Zonotrichia albicollis*, (Bon.)

On May 11, 1877, I heard the unmistakable song of this species within the fort.

66. **Amphispiza bilineata*, (Cass.)

Much more common in summer than winter. The nests are placed in low, thick bushes, rarely more than two feet from the ground. The eggs, when fresh, have a decided bluish tinge.—(SENNETT, B. Rio Grande, 18.—*Poospiza b.*, DRESSER, Ibis, 1865, 488.)

67. *Spizella socialis*, (Wils.)

April.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 19.)

68. *Spizella pallida*, (Swains.)

Very abundant during the winter months, but I do not think that any remain to breed.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 19.)

69. *Melospiza melodia*, (Wils.)

February and December.

70. *Melospiza lincolni*, (Aud.)

Very common in winter.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 18.)

71. *Peucæa arizonæ*, Ridgw.*

Found in some abundance on a salt prairie about nine miles from Fort Brown, but obtained with difficulty, as they could rarely be flushed from among the tall grass. Its notes were frequently heard, and are quite pleasing. A nest found June 16, 1877, was placed among the roots of a tussock of grass: it was made of blades and stems of grasses, and was rather deep, but so frail that it fell to pieces on removal. The eggs, four in number, were quite fresh. They are unspotted white, strongly tinged with greenish blue, and measure .82 by .63.

* The great variation in size and color between the set of eggs of *P. arizonæ* and those of *P. astivalis* appears to me to be inconsistent with their belonging to birds of the same species. In North American Birds, I speak of the color of *astivalis* as being a pure, almost brilliant, white, and their size .74 by .60. This is probably a little smaller than the average. An egg taken by Dr. Bryant in Florida measures .76 by .61. Three eggs, taken by Dr. Gerhard in Northern Georgia, measure .80 by .62, .78 by .61, and .72 by .60. Their color is crystalline white, similar in brilliancy to the eggs of a Woodpecker. On the other hand, the four eggs of *P. arizonæ* measure .85 by .64, .83 by .64, .82 by .65, .80 by .62, averaging .82½ by .63¾, the average of *astivalis* being .77 by .61. The eggs of *P. cassini* have the same crystalline whiteness as those of *astivalis*, while those of *P. carpalis* correspond in color with those of *arizonæ*, and average .73 by .58. The color of the eggs of *P. arizonæ* is of a very light blue, with just a tinge of green, but to some eyes it appears to be a greenish-white.—T. M. B.

[Without specimens of this form in good plumage, it is quite impossible to determine the question of its relationship to *P. astivalis* by the skins alone. All the specimens I have seen are, unfortunately, in the greatly worn and faded midsummer plumage, and, though resembling examples of *P. astivalis* in corresponding dress, are easily distinguishable. Considering the latter fact, in connection with the radical difference in their eggs, as insisted on by Dr. Brewer, I think, upon the whole, that the bird may yet prove to be a distinct species.—R. R.]

72. *Peucaea cassini*, (Woodh.)

Arrives about the middle of March, its sweet song attracting attention at once. Found in rather open chaparral, but usually keeping in thick bushes, where alone it permits a near approach. It usually sings while hidden in some bush, and, I think, rarely utters its notes on the wing unless the female is sitting. Its nest is difficult to find; three, taken April 28, and May 4 and 22, 1877, respectively, were placed at the foot of small bushes and scarcely raised from the ground. They were composed of dried grasses, lined with finer ones and a few hairs, but were very frail. Thirteen eggs taken from these nests are pure white, and average .74 by .57. Feet and legs are peculiarly light yellowish-white; bill pale horn-color, darker above; iris light hazel.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 18.)

73. *Embernagra rufivirgata*, Lawr.

A common resident, frequenting thickets and brush-fences, and permitting a close approach. The only note I have heard, besides a *chip* of alarm, is a repeated *chip chip-chip*, begun slowly, but rapidly increasing till the notes run into each other. I have found the nests with eggs at intervals from May 9 to September 7. These are placed in low bushes, rarely more than three feet from the ground: the nests are rather large, composed of twigs and straws, and lined with finer straws and hairs; they are practically domed, the nests being placed rather obliquely, and the part above the entrance being somewhat built out. The eggs are from two to four in number: thirty-two average .88 by .65, the extremes being .97 by .67 and .81 by .61; they are pure white. Two, and probably three, broods are raised in a season.—(SENNETT, B. Rio Grande, 22.)

74. *Calamospiza bicolor*, (Townsend.)

Rather common during the winter months.—(DRESSER, Ibis, 1865, 490.)

75. *Euspiza americana*, (Gmel.)

Common during the spring migration of 1877.—(DRESSER, Ibis, 1865, 490.—SENNETT, B. Rio Grande, 19.)

76. **Guiraca cærulea*, (Linn.)

A rather common summer visitor, four or five pairs having nests in patches of tall weeds on the reservation.—(DRESSER, Ibis, 1865, 491.—*Goniaphea c.*, SENNETT, B. Rio Grande, 19.)

77. *Cyanospiza cyanea*, (Linn.)

Not rare in April and May.

78. *Cyanospiza versicolor*, (Bonap.)

First taken April 23, 1877. This beautiful species seems to be rather abundant in this vicinity, frequenting mesquite chaparral. Its song has some resemblance to that of the Indigo-bird, and is constantly uttered. I did not succeed in finding any nests.

79. *Cyanospiza ciris*, (Linn.)

A not uncommon summer visitor.—(DRESSER, Ibis, 1865, 491.—SENNETT, B. Rio Grande, 20.)

80. * *Spermophila moreleti*, (Puch.)

This curious little Sparrow is not uncommon during the summer months, and I am inclined to think that a few may pass the winter. During the breeding season the male has a very sprightly song, much resembling that of the Indigo-bird, but sweeter; this it frequently utters while perched on the topmost twig of a bush. They are usually seen in patches of briars and low bushes, at no great distance from water; they are very tame, and will permit a person to approach very closely. At least two pairs built within Fort Brown during the season of 1877. One of these nests, found nearly finished early in May, was in a bush about three feet from the ground: it was not pensile, but was placed on a small branch between three or four upright twigs, and was entirely composed of a peculiar yellow rootlet: it was destroyed by a violent storm before eggs were deposited. A second nest, found May 25, in a young ebony-bush, four feet from the ground, was deserted immediately after completion. It is a delicate little nest, supported at the rim and beneath by twigs, and built of a very fine, dried grass, with which a few horse-hairs, a leaf or two, and a small rag are interwoven: it is 1.70 wide by 1.50 in depth. Both these nests are open and transparent. It is worthy of remark that none of the males seen or killed here were in the typical adult plumage, but in that described by Mr. Lawrence as *S. albugularis*.

The stomachs of the specimens killed were filled with small seeds.

A third nest, found May 5, 1878, was attached to a hanging rim about four feet from the ground. The nest was partly pensile, and was built of delicate rootlets. It contained three young.

81. *Pyrrhuloxia sinuata*, Bon.

Of this species I cannot say much. At times abundant, particularly in the spring, it often escaped observation for months; and though it probably breeds here, I was unable to find any nests. The birds are usually seen in thickets and about brush-fences, and females are more frequently seen than males.—(DRESSER, Ibis, 1865, 491.—SENNETT, B. Rio Grande, 21.)

82. * *Cardinalis virginianus*, (Briss.)

A common resident. Some summer specimens approach var. *coccineus* in the almost entire absence of grayish borders to the feathers of the back and rump.—(DRESSER, Ibis, 1865, 491.—SENNETT, B. Rio Grande, 21.)

83. *Eremophila alpestris* var. *chrysolæma*, (Wagl.)

Common during the winter months. I am confident that this species breeds rather plentifully on a prairie within ten miles of Fort Brown.

Many pairs were seen May 16 and June 2 and 16, 1877, though no nests were found.—(*E. cornuta*, DRESSER, Ibis, 1865, 486.—*E. alpestris chrysolama*, SENNETT, B. Rio Grande, 9.)

84. *Molothrus ater*, (Bodd.)

Very common during winter, arriving early in September and leaving in April. The males frequent the stables and picket-lines in large flocks, with three or four other species of Blackbirds: the females are much less common.—(*M. pecoris*, DRESSER, Ibis, 1865, 492.)

85. * *Molothrus ater* var. *obscurus*, (Gmel.)

Common during summer, replacing var. *pecoris* when it leaves. I have found the eggs or young in nests of *Pyrocephalus* var. *mexicanus*, *Vireo noveboracensis*, *Icteria virens*, *Amphispiza bilineata*, *Embernagra rufivirgata*, *Icterus cucullatus*, *I.* var. *affinis*, and *Agelaius phoeniceus*.* Fifteen eggs now before me average .78 by .61, which is considerably larger than the measurements given by Dr. Brewer.†—(*M. ater obscurus*, SENNETT, B. Rio Grande, 22.)

86. * *Molothrus æneus*, (Wagl.)—The Red-eyed Cowbird.

a. æneus.

Psarocolius æneus, WAGL., Isis, 1829, 758.—BONAP., Cousp. I, 1850, 426.

Molothrus æneus, CABAN., Mus. Hein. I, 1851, 192.—SCL., P. Z. S. 1856, 300; 1859, 365 (Jalapa), 381 (Oaxaca); Catal. 1861, 135, No. 819 (Jalapa).—SCL. & SALV., Ibis, 1860, 34; Nom. Neotr. 1873, 37.—OWEN, Ibis, 1861, 61 (Guatemala; descr. eggs).—CASS., Pr. Ac. Nat. Sci. Phil. 1866, 18 (Mazatlan, Manzanillo, and Jalapa, Mexico; Yucatan; Nicaragua; Costa Rica; Panama).—SUMCHR., Mem. Bost. Soc. I, 1869, 552 (Vera Cruz; hot and temperate regions. Vulg.: "*Tongonito*"; "*Enmante-cado*").—SALVIN, P. Z. S. 1870, 191 (Chitra and Calobre, Veragua).—LAWR., Ann. Lyc. N. Y. IX, 1868, 104 (Costa Rica); Mem. Bost. Soc. II, 1874, 281 (Mazatlan, Manzanillo Bay, and Mts. of Colima, W. Mexico. Habits); Bull. U. S. Nat. Mus. No. 4, 1876, 24 (Tapana, Isth. Tehuantepec; April.—"Iris red").—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Ft. Brown, Texas; very abundant); *ib.* II, Oct. 1877, 85 (habits; descr. of eggs and young.—"Iris blood-red" in adult; brown in young).—COUES & SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. Feb. 1878, 23 (Fort Brown, Tex.—Syn., diag., remarks).

Molothrus robustus, CABAN., Mus. Hein. I, 1851, 193; J. f. O. 1861, 81.

β. armenti.

Molothrus armenti, CABAN., Mus. Hein. I, 1851, 192; J. f. O. 1861, 82.—CASS., P. A. N. S. March, 1866, 18 (Damarara; Savanilla, New Granada).

* On June 13, 1877, I found an egg of this variety in a nest of *Amphispiza bilineata* that contained three young and two addled eggs. The Cowbird's egg was cracked almost entirely across the middle, and in it was one of the addled Sparrow's eggs. This must have been done by some idle Mexican.

† Baird, Brewer, and Ridgway, North American Birds, ii, 157.

SP. CH.—*Adult male*: Head, neck, back, and lower parts soft, silky bronze black, of a peculiar shade, having a brassy greenish olive cast, much like the plumage of the body in *Quiscalus aneus*; the feathers violet-black immediately beneath the surface, the basal portion of the feathers slaty-grayish; scapulars and rump more violet; wings in general, tail-coverts, and tail lustrous silky steel-blue, the tail-coverts and upper wing-coverts more violaceous, the primaries and rectrices more greenish in certain lights; tibiae and anal region silky black; lining of the wings silky violet. Bill and feet deep black; *iris blood-red*. Wing, 4.60–4.80; tail, 3.70–3.80; culmen, .85–.90; tarsus, 1.15–1.25; middle toe, .85–.95. *Young male*: Uniform dull black, with a faint violet lustre on the back and rump, and a slight gloss of bottle-green on the wings and tail. *Adult female*: Uniform brownish-gray, darker above, where very faintly glossed with dull bluish, and paler beneath, many of the feathers of the wings and tail showing indistinctly paler edges, and feathers of the breast exceedingly indistinct darker shaft-streaks. Wing, 4.10; tail, 3.25; culmen, 0.75; tarsus, 1.05; middle toe, 0.85.

HAB.—Mexico and Central America, from the Rio Grande Valley (in the United States) to the Isthmus of Panama.

I have nothing of importance to add to the following notes, which appeared in the October (1877) number of the Bulletin of the Nuttall Ornithological Club, pp. 85–87:—

“The occurrence of this species north of Mexico was noted in the Bulletin of November, 1876 (Vol. I, p. 88). It is now more than a year since it was first observed, and during that time I have had ample opportunity to study its habits, a short account of which may be of interest. This Cowbird is found in Mexico, Guatemala, and Veragua, as well as in Southern Texas; how far it penetrates into the latter State I am unable to say. My first specimens were taken at Hidalgo, on the Rio Grande, seventy miles northwest of Fort Brown, where, however, they are not so abundant as lower down the river. Here they are common throughout the year, a small proportion going south in winter. Those that remain gather in large flocks with the Long-tailed Grackles, common Cowbirds, and Brewer’s, Red-winged, and Yellow-headed Blackbirds; they become very tame, and the abundance of food about the picket-lines attracts them for miles around. *M. aneus* is readily distinguishable in these mixed gatherings from the other species by its blood-red iris and its peculiar top-heavy appearance, caused by its habit of puffing out the feathers of the head and neck. This habit is most marked during the breeding season and in the male, but is seen throughout the year.

“About the middle of April the common Cowbird, Brewer’s, and Yellow-headed Blackbirds leave for the North; the Long-tailed Grackles have formed their colonies in favorite clumps of mesquite trees; the Redwings that remain to breed have selected sites for their nests; the dwarf Cowbirds (*Molothrus ater* var. *obscurus*) arrive from the South,

and *M. aeneus* gather in flocks by themselves, and wait for their victims to build. The males have now a variety of notes, somewhat resembling those of the common Cowbird, but more harsh. During the day they scatter over the surrounding country in little companies of one or two females and half a dozen males, returning at nightfall to the vicinity of the picket lines. While the females are feeding or resting in the shade of a bush, the males are eagerly paying their addresses by puffing out their feathers, as above noted, strutting up and down, and nodding and bowing in a very odd manner. Every now and then one of the males rises in the air, and, poising himself two or three feet above the female, flutters for a minute or two, following her if she moves away, and then descends to resume his puffing and bowing. This habit of fluttering in the air was what first attracted my attention to the species. In other respects their habits seem to be like those of the eastern Cowbird.

"My first egg of *M. aeneus* was taken May 14, 1877,[*] in a Cardinal's nest. A few days before this a soldier brought me a similar egg, saying he found it in a Scissor-tail's (*Milvulus*) nest; not recognizing it at the time, I paid little attention to him, and did not keep the egg. I soon found several others, and have taken in all twenty-two specimens the past season. All but two of these were found in nests of the Bullock's, Hooded, and small Orchard (*I. var. affinis*) Orioles. It is a curious fact that although Yellow-breasted Chats and Red-winged Blackbirds breed abundantly in places most frequented by these Cowbirds, I have but once found the latter's egg in a Chat's nest, and never in a Red-wing's, though I have looked in very many of them.[†] Perhaps they feel that the line should be drawn somewhere, and select their cousins the Blackbirds as coming within it; the Dwarf Cowbirds are not troubled by this scruple, however. Several of these parasitic eggs were found under interesting conditions. On six occasions I have found an egg of both Cowbirds in the same nest; in four of these there were eggs of the rightful owner,‡ who was sitting; in the other two the Cowbirds' eggs were alone in the nests, which were deserted: but I have known the Hooded Oriole to sit on an egg of *M. aeneus* which was on the point of hatching when found; how its own disappeared I cannot say. Once two eggs of *aeneus* were found in a nest of the small Orchard Oriole (*var. affinis*). Twice I have seen a broken egg of *aeneus* under nests of Bullock's Oriole on which the owner was sitting.

"Early in June a nest of the Hooded Oriole was found with four eggs and one of *M. aeneus*, all of which I removed, leaving the nest. Happening to pass by it a few days later, I looked in, and to my surprise found two eggs of *aeneus*, which were taken: these were so unlike that

*In the Bulletin misprinted 1876.

†Since writing this, I have found this Cowbird's egg in a deserted Redwing's nest.

‡"It would be interesting to know what would have become of the three species in one nest, and had the latter been near the fort, where I could have visited them daily, I should not have taken the eggs. It is probable, however, that *M. aeneus* would have disposed of the young Dwarf Cowbird as easily as of the young Orioles."

they were probably laid by different birds. Still another egg, and the last, was laid in the same nest within ten days. But the most remarkable instance was a nest of the small Orchard Oriole found June 20, containing three eggs of *æneus*, while just beneath it was a whole egg of this parasite, also a broken one of this and of the Dwarf Cowbird. Two of the eggs in the nest were rotten; the third, strange to say, contained a living embryo. As the nest was certainly deserted, I can only account for this by supposing that the two rotten ones were laid about the first week of June, when there was considerable rain, and that the other was deposited soon after, since which time the weather had been clear and very hot. On one occasion I found a female *æneus* hanging with a stout thread around her neck to a nest of the Bullock's Oriole. The nest contained one young one of this Cowbird, and it is probable that its parent, after depositing the egg, was entangled in the thread on hurriedly leaving the nest, and then died; it had apparently been dead about two weeks. This case supports the view that the eggs or young of the owner are thrown out by the young parasite, and not removed by its parent, though I could find no trace of them beneath this nest.

"Twenty-two eggs of *M. æneus* average .90 by .70, the extremes being .95 by .75 and .82 by .65. The color is a greenish white, unspotted, soon fading to a dull opaque white. There is more than the usual variation in shape. Some are almost perfectly elliptical, others are nearly round; some are quite pointed at the smaller end, while others still are there abruptly truncate.

"The young, soon after leaving the nest, have the plumage uniform dull black; cheeks and sides of head bare; iris brown."*

87. **Agelæus phœniceus*, (Linn.)

A common resident, breeding abundantly. The nests and eggs are smaller than the average of those found in more Northern States.—(DRESSER, Ibis, 1865, 492.—SENNETT, B. Rio Grande, 24.)

88. *Xanthocephalus icterocephalus*, (Bonap.)

Rather rare during winter, and I do not think that any breed, in this immediate vicinity at least.—(DRESSER, Ibis, 1865, 492.—SENNETT, B. Rio Grande, 24.)

89. **Sturnella magna*, (Linn.)

Common during winter.—(SENNETT, B. Rio Grande, 24.)

* In the Ibis of January, 1861, pp. 61, 62, are the following notes by R. Owen on the supposed eggs of this species:—"The eggs are pale greenish white, and measure, axis 1 inch, diam. .75. A few eggs of the 'Tordito', taken from the nests of the 'Chorcha' (*Icterus*) and the 'Cien-Sante Mejicano' (*Mimus gracilis*). The Indians here all identify these eggs as those of the 'Tordito'. However, personally, I have never surprised the bird on the nest of any other species. At the same time I may add that I have never seen it either building or occupied in any other domestic occupation whatever, which somewhat confirms the statement aforesaid. The eggs are found most commonly in the nests of the 'Chorcha' and the 'Cien-Sante Mejicano', and occasionally in that of the largest species of 'Chatillo' (*Pitangus derbianus*)."—T. M. D.

90. *Sturnella magna* var. *mexicana*, ScL.

"*Sturnella magna*", SWAINS., Philos. Mag. I, 1827, 436.

"*Sturnella hippocrepis*", ScL., P. Z. S. 1856, 30, 301; 1859, 58, 365, 381.—Sci. & SALV., Ibis, 1859, 19; 1860, 34.—LAWR., Ann. Lyc. N. Y. VIII, 1865, 177 (David, Veragua).

Sturnella mexicana, ScL., Ibis, 1861, 179; P. Z. S. 1864, 175 (City of Mexico); Catal. 1861, 139, No. 842 (Jalapa).—CASS., Proc. Ac. Nat. Sci. Phila. 1866, 24 (Mexico; Guatemala).—SALVIN, P. Z. S. 1867, 142 (Veragua).

"*Sturnella ludoriciiana*", SALV., P. Z. S. 1870, 191 (Veragua).

Sturnella magna var. *mexicana*, B. B. & R., Hist. N. Am. B. H, 1:74, 172 (Mexico; Central Am.).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1:76, 24 (Barris and Sta. Efigenia, Is. h. Tehuantepec; Sept., Feb.).

Sturnella magna, a. *mexicana*, COUES, Birds N. W. 1:74, 190.

Summer specimens of the Meadow Lark found at Fort Brown have been identified by Mr. Ridgway as typical *mexicana*. Its notes and habits, as observed there, do not seem to differ essentially from those of *S. magna*. It is abundant from April until October.

[This Southern form may be easily distinguished from true *magna* by its smaller general size (including the bill) and much larger legs and feet, which are not only relatively, but absolutely, longer and stouter than in *S. magna*. The two specimens examined by me were obtained at Fort Brown, August 21 and September 13, 1877. They agree exactly with Mexican examples.—R. R.]

91. *Icterus auduboni*, Giraud.

This fine Oriole is found in moderate abundance, and is the only species that is resident. During the summer months, it is usually found in deep woods at some distance from houses, but during the winter it is less shy and retiring. They are frequently captured and offered for sale by Mexicans in this vicinity, but several I have kept would not sing at all in captivity. When free, their usual song is a prolonged and repeated whistle of extraordinary mellowness and sweetness, each note varying in pitch from the preceding. If once heard, it can never be forgotten. I have not succeeded in finding any nests. There is considerable variation in the extent of white edging to the wings and tail, some specimens closely approaching var. *melanocephalus*.—(SENNETT, B. Rio Grande, 26.)

92. *Icterus cucullatus*, Swains.

This is perhaps the most common Oriole in this vicinity during the summer, arriving about the last week in March. It is less familiar than Bullock's Oriole, and, like the preceding species, is usually found in woods. The nests of this bird found here are perfectly characteristic, and cannot be confounded with those of any allied species; they are usually found in one of the two following situations: the first and most frequent is in a bunch of hanging moss, usually at no great height from the ground; when so placed, the nests are formed almost entirely by hollowing out and matting the moss, with a few filaments of a dark hair-like moss as lining; the second situation is in a bush (the name of

which I do not know) growing to a height of about six feet, a nearly bare stem throwing out two or three irregular masses of leaves at the top; these bunches of dark green leaves conceal the nest admirably; it is constructed of filaments of the hair-like moss just referred to, with a little Spanish moss, wool, or a few feathers for the lining; they are rather wide and shallow for Orioles' nests, and, though strong, they appear thin and delicate. A few pairs build in Spanish bayonets (*Yucca*) growing on sand ridges in the salt prairies; here the nests are built chiefly of the dry, tough fibres of the plant, with a little wool or thistle-down as lining; they are placed among the dead and depressed leaves, two or three of which are used as supports. A large series of eggs now before me are quite characteristic, and can readily be distinguished from eggs of our other Orioles by the absence of irregular blotches and pen-marks and by the white or very slightly bluish ground-color. The markings are chiefly at the larger end in an irregular ring of spots of varying shades of brown and lilac. Some sets are precisely like large Vireos' eggs. The average size is .82 by .59, with comparatively little variation.—(SENNETT, B. Rio Grande, 25.)

93. * *Icterus bullocki*, Swains.

Common summer visitant. The breeding habits of this bird are quite unlike those of the Hooded Oriole. Instead of concealing its nest admirably in bunches of leaves or hanging moss, it is conspicuously placed at the extremity of an upper branch of a mesquite or ratama tree, usually at the edge of a prairie or near houses. One set of eggs has the ground-color a beautiful pinkish buff.—(SENNETT, B. Rio Grande, 25.)

94. *Icterus baltimore*, (Linn.)

Two specimens taken in April. I think that Mr. Dresser is in error in stating in the Ibis that this Oriole breeds at Matamoras.—(DRESSER, Ibis, 1865, 493.)

95. * *Icterus spurius* var. *affinis*, Lawr.

This small race of the Orchard Oriole is found rather plentifully from the latter part of March until August. Nests found here are much smaller than Eastern ones; in size and shape, they are more like Vireos'. This species and Bullock's are frequently found breeding in small, irregular colonies composed of both species; the Hooded Oriole does the same, but with individuals of its own species only.—(DRESSER, Ibis, 1865, 493.—SENNETT, B. Rio Grande, 25.)

96. *Scolecophagus cyanocephalus*, (Wagl.)

Brewer's Blackbird is very abundant from about the first week in October until April.—(DRESSER, Ibis, 1865, 493.—SENNETT, B. Rio Grande, 27.)

97. * *Quiscalus macrurus*, Swains.

This handsome Grackle is a very common resident, and large numbers

breed on the reservation. Early in April, after several weeks of noisy courtship, they begin to build in irregular colonies, and by the middle of the month have eggs. The nests are perhaps most frequently placed near the top of one of the main upright branches of a young mesquite-tree. They are strongly built of straws, leaves, and grasses, mud being used freely. Where Spanish moss is plentiful, the nests are sometimes composed entirely of it, and I have found them among tule-reeds where several species of Herons were breeding. I have also found their nests either supported by the lower part of the nest of the Caracara Eagle or in the same tree. The eggs, usually three in number, vary greatly in appearance; the ground-color is usually a greenish white or purplish-brown, more or less heavily spotted and dashed with several shades of brown and black. These markings are apt to be heavier at the smaller end, which frequently has a much darker ground-color than the larger; and this is so often the case as to be rather characteristic. Forty-five eggs now before me give the following measurements:—average, 1.26 by .85; largest, 1.44 by .91; smallest, 1.16 by .82. The annual moult takes place in August. Unlike the Boat-tailed Grackle, the males of this race do not leave the females while incubating, but are jealous of intruders, and take their share of feeding the young. The various notes of this bird are quite indescribable, and must be heard to be appreciated. The long and heavy tail of this Grackle makes it easily recognizable at a long distance, but is rather inconvenient when there is much wind. At such times, the birds are obliged to “head up” wind, like so many sloops at anchor. They have a frequent and curious habit of throwing their heads up and far back, so that the reversed bill is almost parallel with the back.—(DRESSER, *Ibis*, 1865, 493.—SENNETT, *B. Rio Grande*, 27.)

98. *Xanthura luxuosa*, Less.

The Rio Grande Jay is a common resident about Fort Brown and higher up the river, but does not seem to pass much into the interior of Texas. It is a noisy and gaudy species, soon making its presence known by its harsh cries or by its green and yellow plumage, seen for a moment as it moves about. Though at times shy, it is often very tame and bold, entering tents and taking food off plates or from the kitchen whenever a good opportunity offers. Large numbers are caught by the soldiers in traps baited with corn, but the plumage is their only attraction as a cage-bird. Its eggs and nest were first described in vol. i, p. 89, of the *Bulletin of the Nuttall Ornithological Club*. Since that time, I have found several other nests, but they do not affect the statements above made in regard to their breeding habits.—(DRESSER, *Ibis*, 1865, 495.—SENNETT, *B. Rio Grande*, 29.)

99. *Sayornis fuscus*, Gmel.

Not uncommon from October until April.—(DRESSER, *Ibis*, 1865, 473.)

100. *Sayornis sayus*, Bonap.

More abundant than the preceding during the winter months.—(DRESSER, *Ibis*, 1865, 473.)

101. *Contopus borealis*, (Swains.)

Not rare during the migrations.—(DRESSER, Ibis, 1865, 474.)

102. *Contopus virens*, (Linn.)

Breeds; a few pass the winter.—(DRESSER, Ibis, 1865, 474.—SENNETT, B. Rio Grande, 33.)

103. *Contopus richardsoni*, (Swains.)

August.—(DRESSER, Ibis, 1865, 474.)

104. *Empidonax minimus*, Baird.

September.—(DRESSER, Ibis, 1865, 474.—SENNETT, B. Rio Grande, 33.)

105. *Empidonax acadicus*, (Gmel.)

Two specimens taken in the spring.—(DRESSER, Ibis, 1865, 475.)

106. *Empidonax pusillus* var. *trailli*, (Aud.)

August 7, 1876.—(*E. trailli*, DRESSER, Ibis, 1865, 474.)

107. *Empidonax flaviventris*, Baird.

A single specimen taken.—(DRESSER, Ibis, 1865, 475.)

108. *Tyrannus carolinensis*, (Gmel.)

Rather common during the migrations, arriving about the first week in April and September.—(DRESSER, Ibis, 1865, 472.—SENNETT, B. Rio Grande, 31.)

109. * *Milvulus forficatus*, (Gmel.)

Common summer visitor, arriving about March 20 and leaving in September and October. Several pairs of this exquisite Flycatcher build in the low trees surrounding the parade-ground of the fort. The nests resemble those of the Kingbird, but are smaller, and, as a rule, are not more than six or seven feet from the ground. The eggs are from three to five in number, and are deposited by the latter part of April. The annual moult takes place in July and August. About the middle of October, 1876, just before sunset, a flock of at least one hundred and fifty of these birds passed over the fort; they were flying leisurely southward, constantly pausing to catch passing insects; and in the rays of the setting sun their salmon-colored sides seemed bright crimson.—(DRESSER, Ibis, 1865, 472.)

110. *Myiarchus crinitus*, (Linn.)

Taken in March and April. I am confident that none of this variety remain to breed.—(DRESSER, Ibis, 1865, 473.—SENNETT, B. Rio Grande, 32.)

111. *Myiarchus erythrocerus* var. *cooperi*.

? *Tyrannus cooperi*, KAUP,* P. Z. S. Feb. 11, 1851, 51 ("Northern America and Chili").

Myiarchus cooperi, BAIRD, Birds N. Am. 1858, 180; Catal. N. Am. B. 1859, No. 132.—SCL., P. Z. S. 1859, 384; Catal. 1861, 232, No. 1428 (Mexico; Guatemala).—SCL. & SALV., Ibis, 1859, 122, 440; 1870, 837 (coast Honduras).—LAWR., Ann. Lye. N. Y. ix, 1869, 202 (Yucatan).

Myiarchus crinitus, c. var. *cooperi*, COUES, P. A. N. S. July 2, 1872, 67 (Tehuantepec, Mazatlan, and Guadalajara, S. W. Mexico; Guatemala?).

Myiarchus crinitus var. *cooperi*, B. B. & R., Hist. N. Am. B. II, 1874, 331 (Mazatlan, Tehuantepec, and Yucatan).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 28 (Tapana and Sta. Efigenia, Isth. Tehuantepec; April; Dec.).

? *Tyrannus mexicanus*, KAUP,† P. Z. S. Feb. 11, 1851, 51 (*loc. incog.*).

Myiarchus mexicanus, LAW., Ann. Lye. N. Y. IX, 1869, 202 (Yucatan); Pr. Boston Soc. June 7, 1871 (Tres Marias Islands, W. Mexico).—SUMICHR., Mem. Boston Soc. 1, 1869, 557, 560 (Vera Cruz; hot region).

Myiarchus yucatanensis, LAW., P. A. N. S. Nov. 21, 1871, 235 (Yucatan, Mus. G. N. L.=*M. mexicanus*, Ann. Lye. N. Y. IX, 1869, 202!).

Myiarchus crinitus erythrocerus, COUES & SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. vol. iv, No. 1, Feb. 1878, 32 (Ft. Brown, Texas).

Alguacil de Moscas, Tres Marias vernac. (*vide* LAW., *l. c.*).

The occurrence of this variety within our limits was noted in the April (1878) number of the Bulletin of the Nuttall Ornithological Club. Since that time I have paid particular attention to the species, and find that it is the only one of the genus that breeds on the Lower Rio Grande, which it does in considerable numbers. In its notes and habits, it appears to closely resemble the *M. crinitus*. Seven identified sets of thirty two eggs average .93 by .66, the extremes being 1.03 by .73 and .82 by .65. With one exception, no snake-skins were used in the construction of any of these nests. They were composed of felted locks of wool and hairs, and were placed not far from the ground, either in old Woodpeckers' holes or in natural hollows in decayed trees or stumps.

NOTE.—The eggs of the *Myiarchus*, as a genus, have a very remarkable family resemblance. They are of a rounded-oval shape, in some instances the relation of the axis to the diameter being as $8\frac{1}{2}$ to $7\frac{1}{2}$, and averaging about $8\frac{1}{2}$ to 7. The ground-color varies from a light buff to a dark cream-color; over these are distributed two sets of markings, all of them having a longitudinal direction, often narrow lines, leaving broad, unmarked spaces between them, and not unfrequently expand-

* "With shorter wings than *mexicana*, but with longer bill, like *crinita*; throat and over breast light gray, not so dark as in *crinita*; the black stripe along the inner webs of the tail-feathers is broader, like *stolidus*." [Type in Brit. Mus.]

† "With short wings; all the wing-feathers, except the first, with rufous margins; breast light ash-gray; above lighter." [Type in Brit. Mus.]

ing into broad and confluent patches about the larger end. This genus is represented in my collection by the present species, and *M. crinitus*, *M. mexicanus*, *M. cooperi*, and *M. validus*, of Jamaica. In all these, except the last, the two very distinct colorations are more or less noticeable: these are a deep shade of reddish-brown and a lighter marking of dark stone-color or slate, with slight tinge of purple or lilac. In the *Myiarchus crinitus*, the dark brown is the predominant color; in *M. erythrocerus*, the stone-colored markings are much more abundant than in any of the others; in *M. validus*, on the contrary, these are wholly wanting. The set of eggs identified by Dr. Merrill, five in number, range from .99 to .94 of an inch in length and from .69 to .74 in breadth, averaging .97 by .72½. Another set of three, not identified, but undoubted, average 1.02 by .72. A third set, from the collection of the late Dr. Berlandier, and hitherto supposed to belong to *M. mexicanus*, are marked with stone-colored dashes that are much darker and have a decidedly purplish tinge. These average .95 by .74.

A set of five eggs, from California, of *M. mexicanus*, average .84 by .69, and another set .84 by .68. In these, the markings of both kinds are fewer, and the greater part of these in slender lines, the purplish slate being about as abundant as the reddish-brown stripes. Five eggs of *M. crinitus* average .95 by .71¾, are deeply marked, and chiefly with the brown stripes. The eggs of *M. cooperi* average .91½ by .73, and are very similar to those of *M. mexicanus*, except in size. The egg of *M. validus* is marked by but one kind of colored stripe, a combination of lilac and red-brown. The ground-color is more distinctly a deep and warm shade of cream: measurement, .84 by .69.—T. M. B.

NOTE BY R. R.—The proper name of this species has been a subject of much discussion and difference of opinion, but it seems now generally settled that it is to be known as *erythrocerus*, Sel. & Salv. Admitting that two races may be distinguished (a smaller Southern, and a larger Northern, with grayer colors), it is less easy to decide what name the Northern race should bear,—the Southern one being, of course, the typical *erythrocerus*. As to point of date, the choice evidently lies between *Tyrannula mexicana* and *T. cooperi* (1857), both these names first occurring on the same page, but *mexicana* first, and therefore entitled to priority. The difficulty is that neither of the brief diagnoses accompanying these names give any character of even the least importance, and are therefore no aid whatever in determining what species is meant. The types of both these birds are said to exist in the British Museum: and Dr. P. L. Selater, who has examined that of *T. mexicana*, says that it is the same as the bird called *M. cooperi* (Kaup) by Professor Baird, in *Birds N. Am.* 1858, 180. If this be true, it raises the question as to whether Professor Baird's identification of Kaup's *T. cooperi* was correct, since it seems strange that the latter author would, on the same page, describe different specimens of the same bird as distinct species! It

seems to be generally conceded, however, that Professor Baird was right in this determination; therefore, as Dr. Cones surmises (Pr. Ac. Nat. Sci. Phila. 1872, p. 68), *Tyrannula mexicana*, Kaup, and *T. cooperi*, Kaup, must have been based upon variations of one species—the one under consideration!

In attempting to determine to which of the two forms of the species Dr. Merrill's specimens belonged, I found it necessary to carefully examine all the material available. This consisted of twenty-four specimens, belonging chiefly to the collection of the National Museum. After taking careful measurements of every specimen, and submitting all to the closest scrutiny and comparison, I found myself forced to a conclusion different from that reached by Dr. Cones (see Bull. U. S. Geol. and Geog. Surv. Terr. IV, No. 1, pp. 32, 33), in whose opinion regarding the matter I had previously coincided. I now find, that (1) while extreme examples of var. *cooperi* are astonishingly different from *erythrocerus* proper, such individuals form a very small proportion of the whole, and are chiefly from Western and Southwestern Mexico, where several other species of birds, notably *Pyrranga coccinea* (var. *cooperi*, Ridgw.), attain the same great development of the bill (and, in fact, all the measurements); that (2) nearly all specimens from Mexico and Guatemala should be referred to *cooperi*, examples referable to *erythrocerus* on account of dimensions and shades of color being comparatively rare. Besides averaging larger than var. *erythrocerus*, var. *cooperi* has usually a grayer cast of plumage, in this respect corresponding to the Mexican race of *Tyrannus melancholicus* (var. *couchi*, Baird), *Myiarchus laurencii*, and numerous other birds of similar geographical distribution. The only satisfactory test, however, which I have been able to apply in determining to which race doubtful specimens should be referred is that of size, as follows:—

Var. ERYTHROCERCUS.—Wing, 3.40–3.95 (average, 3.77); tail, 3.60–4.00 (average, 3.82); bill, from nostril, .55–.68 (average, .61); tarsus, .85–.88 (average, .86).* *Hab.*—Eastern Tropical America, from Paraguay to Southern Mexico, but chiefly southward of the latter country.

Var. COOPERI.—Wing, 3.85–4.45 (average, 4.15); tail, 4.00–4.60 (average, 4.25); bill, from nostril, .60–.82 (average, .69); tarsus, .88–.95 (av-

* Six specimens, as follows:—

Museum No.	Sex and age.	Museum.	Locality.	Date.	Wing.	Tail.	Bill from nostril.	Tarsus.
16348	♂ ad.	U. S.	"Brazil"	Aug. 1, 1859	3.65	3.60	.58	.85
16349	1 ad.	U. S.	Paraguay	May 1, 1859	3.75	3.80	.60	.85
29423	1 ad.	U. S.	Costa Rica		3.90	3.80	.62	.88
39210	♂ ad.	U. S.	Merida, Yucatan	May 29, 1865	3.95	3.95	.68	.85
39213	♂ ad.	U. S.	do	Apr. 9, 1865	3.41	3.75	.55	.88
57649	♂ ad.	U. S.	Sta. Etgenia, Tehuantepec	Dec. 18, 1868	3.95	4.00	.65	.85

erage, 92).* *Hab.*—Mexico (including Lower Rio Grande Valley in Texas) and Guatemala.

The principal references to var. *erythrocerus* are the following:—

?*Tyrannula irritabilis*, BONAP., Consp. I, 1850, 189. Supposed to belong here from quotation of Azara. "South America." Not *Tyrannus irritabilis*, Vieill.!

Myiarchus crinitus, b. var. *irritabilis*, COUES, P. A. N. S. July 2, 1872, 65 (Central and South America, Paraguay, Rio Parana, Bahia, Venezuela, Yucatan, Guatemala, Costa Rica).

Myiarchus crinitus var. *irritabilis*, B. B. & R., Hist. N. Am. B. II, 1874, 331 (Paraguay to Costa Rica).

Myiarchus erythrocerus, SCL. & SALV., P. Z. S. 1868, 631, 632 (Venezuela); Nom. Neotr. 1873, 52.—?SEMPER, P. Z. S. 1871, 271 (Sta. Lucia, W. I.); 1872, 650.

Pyrocephalus erythrocerus, GRAY, Hand-list, I, 1869, No. 5522 (s. g. *Myiornax*. Quotes "*crinitus*, p., Hartl.; *irritabilis*, p., Bp.; *ferox* ♂, Burm.").

Pipperie gran-bois, St. Croix vernac. (*fide* SEMPER, l. c.).

112. *Myiarchus cinerascens*, Lawr.

Only two specimens of this variety were taken.—(*M. mexicanus*, DRESSER, Ibis, 1865, 475.)

113. *Pyrocephalus rubineus* var. *mexicanus*, Selat.

Resident, but more abundant in summer than in winter. During the breeding season, the male frequently utters a peculiar twittering song while poised in the air about thirty feet from the ground; during the song, it frequently snaps its bill as if catching insects. Its note of anger and alarm is a mew. Except during the breeding season, the birds are decidedly shy. The nests are usually placed upon horizontal forks of ratama-trees, growing upon the edge of a prairie, and rarely more than six feet from the ground. They bear considerable resemblance to nests of the Wood Pewee in appearance and in the manner in which they are saddled to the limb; the bottoms are made of small twigs, over which

* Eighteen specimens, as follows:—

Museum No.	Sex and age.	Museum.	Locality.	Date.	Wing.	Tail.	Bill from nostril.	Tarsus.
9100	— ad.	U. S.	"Mexico" (<i>M. cooperi</i> , Baird, B. N. Am.).	.....	4.10	4.00	.69	.90
29690	— ad.	U. S.	Mexico .....	.....	4.05	4.05	.62	.88
37364	— ad.	U. S.	Tres Marias, Western Mexico	Jan. —, 1865	4.10	4.20	.70	.93
52910	♂ ad.	U. S.	Mazatlan, Mexico .....	.....	4.30	4.20	.70	.95
1182	♂ ad.	R. R.	do .....	.....	4.30	4.40	.72	.95
5397	♂ ad.	R. R.	Tehuantepec, Southern Mexico	Dec. 18, 1868	4.05	4.05	.65	.92
—	♂ ad.	R. R.	do	Dec. 24, 1868	4.00	4.25	.75	.92
57640	♂ ad.	U. S.	do	Dec. 16, 1868	4.25	4.55	.60	.90
58644	♂ ad.	U. S.	do	May 5, 1869	3.85	4.00	.72	.88
58815	♂ ad.	U. S.	do	Apr. 27, 1869	4.10	4.30	.68	.92
59617	♂ ad.	U. S.	do	Oct. 8, 1869	4.15	4.25	.68	.88
73631	♂ ad.	U. S.	do	Apr. 11, 1871	4.10	4.20	.68	.95
73632	♂ ad.	U. S.	do	May 27, 1871	4.40	4.60	.75	.95
73633	♂ ad.	U. S.	do	May 27, 1871	4.05	4.15	.73	.98
42337	— ad.	U. S.	Guadalajara, Southern Mexico .....	.....	4.45	4.60	.82	.95
71138	♂ ad.	U. S.	Fort Brown, Texas	May 10, 1877	4.05	4.20	.65	.90
73022	♂ ad.	U. S.	do	Apr. 1, 1876	.....	.....	.....	.....
49312	— ad.	U. S.	Central Guatemala .....	.....	4.15	4.15	.62	.90

are various soft materials felted together; a few hairs or a little wool form the lining; the rims are covered with lichens; the cavity is slight, varying from .8 to 1.25 inch in depth by 2 in width, and the whole structure is easily overlooked. The usual number of eggs is three; the ground-color is a rich creamy-white, with a ring of large brown and lilac blotches at the larger end. Fourteen eggs now before me average .73 by .54. A nest of this species, found May 19, 1877, contained a young Dwarf Cowbird and three addled eggs, which latter I removed. On revisiting the same nest ten days later, I found three fresh eggs, on which the female was sitting. As the young Cowbird could not have been fledged by this time, it would seem as if the Flycatchers, on finding that their eggs had been removed, had thrown out the parasite and laid again.—(*P. rubineus*, DRESSER, Ibis, 1865, 475.—*P. rubineus mexicanus*, SENNETT, B. Rio Grande, 34.)

114. *Ceryle alcyon*, (Linn.)

Not common from October until April.—(DRESSER, Ibis, 1865, 471.—SENNETT, B. Rio Grande, 36.)

115. *Ceryle americana* var. *cabanisi*, (Tschudi.)

Two specimens, obtained in May and October respectively. The scarcity of Kingfishers on the lower Rio Grande is doubtless due to the muddy water, that renders it difficult for them so see their prey.—(*C. americana*, DRESSER, Ibis, 1865, 472.)

Genus NYCTIDROMUS, Gould.

Nyctidromus, GOULD, Icon. Av. II, 1838. (Type, *N. derbyanus*, Gould.)—GRAY, List Genera B. ed. 2, 1841, 10; Gen. and Subg. 1855, 11; Hand-list, I, 1869, 60.—GRAY & MITCH., Genera B. I, 1849, 48.—CASSIN, P. A. N. S. 1851, 179.—SCL., P. Z. S. 1866, 144.—SCL. & SALV., Nom. Neotr. 1873, 97.—BOUCARD, Cat. Av. 1876, No. 2291.

Eucapripodus, LESSON, 1843 (*fide* GRAY).

Lucapripodus, LESSON, 1847 (*fide* GRAY).

CH.—Similar to "*Antrostomus*", but having the tarsus longer than the middle toe, and completely naked; the tail about equal to the lengthened wing (instead very much shorter), and the third instead of the second primary longest; lateral toes less than half as long as the middle toe, including the claw.

The characters given above are all that I am able to discover as distinguishing the present form from the species referred by most writers to the so-called genus *Antrostomus*, Gould. After very careful comparisons of species of true *Caprimulgus* (as restricted) with those of the so-called genera *Antrostomus* and *Stenopsis*, I am at a loss to find characters of generic importance between them. *A. carolinensis*, the type of the former genus, differs, it is true, from all the others in possessing lateral filaments to the rectal bristles, while *A. nuttalli* is aberrant in other respects. There is such a difference in the details of form between almost every two species, however, that it is seriously questionable

whether they should not all be included under *Caprimulgus*. The only alternative seems to be a further subdivision of one or more of the so-called genera, especially "*Antrostomus*", leaving *A. carolinensis* as the typical and only species, referring *A. vociferus* to *Caprimulgus*, and instituting a new genus for *A. nuttalli*. The following scheme may serve to show the nature of the differences between the three North American species usually included in *Antrostomus* and the genus *Nyctidromus*:—

A.—Tarsus feathered in front almost to the toes, and shorter than the middle toe; first quill longer than the fourth.

1. CAPRIMULGUS.—Rictal bristles without lateral filaments. Sexes with the tail differently marked. Tail rounded. (Including *C. vociferus*.)
2. "ANTROSTOMUS."—Rictal bristles with fine lateral filaments. Sexes with the tail differently marked. Tail rounded. (Including only the type, *A. carolinensis*.)

B.—Tarsus entirely naked in front, and longer than the middle toe; first quill shorter than the fourth.

- 3.—Tail even, much shorter than the wing. Sexes with the tail not differently marked. Plumage with a peculiarly soft, velvety surface. (*C. nuttalli* only.)
4. NYCTIDROMUS.—Tail rounded, equal to the wing. Sexes with the tail differently marked.

116. * *Nyctidromus albicollis*.—Pauraque Goatsucker.

Montvroyan de la Guyane, BUFF., Hist. Nat. des Ois. VI, 1779, 549.

Crepaud-volant ou Tette-Chevre roux, de la Guiane, BUFF., Pl. Enl. 733 (= ♀).

White-throated Goatsucker, LATH., Synop. II, pt. ii, 1785, 596, No. 7.

Guiana Goatsucker, LATH., t. c. 598, No. 9.

Caprimulgus albicollis, GMEL., S. N. I, ii, 1788, 1030 (ex LATH., l. c.).—LATH., Ind. Orn. II, 1790, 575, No. 7.—VIEILL., Enc. Méth. 1823, 536, No. 4.—LICHT., Verz. Doubl. 1823, 59, 606.—D'ORB., Guerin's Mag. 1837, 67.—HARTL., Ind. Azara, 1847, 20, 310.—D'ORB. & LAFR., Rev. Zool. 1837, 67.—CABAN., in SCHOMB. Guiana, III, 1848, 710, No. 204.

Nyctidromus albicollis, BURM., Th. Bras. II, 1856, 389, No. 1.—SCL., P. Z. S. 1866, 124 (fig. of bones of foot), 144 (S. Mexico to S. Brazil).—SCL. & SALV., *ib.* 193 (Ucayali, E. Peru); 1867, 752 (Huallaga, E. Peru), 978 (Upper Amazon); 1869, 252 (Maruria, Venezuela), 598 (Conispata, Peru); 1870, 782 (S. of Merida, Venezuela), 837 (coast of Honduras); 1873, 186 (Peru), 290 (E. Peru); 1875, 237 (Venezuela); Nom. Neotr. 1873, 97 (Central America; S. Am. to Brazil).—LAWR., Ann. Lye. N. Y. IX, 1869, 204 (Yucatan); Pr. Boston Soc. 1871, — (Tres Marias Islands, W. Mexico; common); Mem. Boston Soc. II, 1874, 291 (Mazatlan, Colima, and Tres Marias, W. Mexico); Bull. U. S. Nat. Mus. No. 4, 1876, 31 (Isth. Tehuantepec).—WYATT, Ibis, 1871, 375 (L. Paturia, New Granada).—LEE, Ibis, 1873, 134 (Buenos Ayres).—LAYARD, *ib.* 389 (Pará).—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Fort Brown, Texas, April and May; not rare; breeding).

Caprimulgus guianensis, GMEL., S. N. I, ii, 1788, 1030 (based on BUFF., Pl. Enl. 733).—LATH., Ind. Orn. II, 1790, 586, No. 8.—MAX. Beitr. III, 1831, 318, No. 4.

Nyctidromus guianensis, CASS., P. A. N. S. 1851, 183, 189 (Cayenne; Surinam); Catal. Caprim. Mus. Phila. Acad. 1851, 12.—BURM., Syst. Ueb. II, 1856, 391.—SCL., Catal. Am. B. 1862, 281, No. 1690 (Orizaba; Bogota; Vera Paz; Esmeraldas, Ecuador; Trinidad); P. Z. S. 1864, 176 (City of Mexico).—TAYLOR, Ibis, 1864, 90 (Trinidad).—LAWR., Ann. Lye. N. Y. VII, 1861, 290 (Isth. Panama).—SCL. & SALV., P. Z. S. 1864, 364 (Isth. Panama).—PELZ., Orn. Bras. 1871, 13.—SALVIN, P. Z. S. 1870, 204 (Veragua).

Ibiyau, AZARA, Apunt. 1801, No. 310.

Nyctidromus americanus, CASSIN, Pr. A. N. S. 1851, 179, 180; Catal. Caprim. Mus. Phila. Acad. 1851, 12 (Nicaragua).—SCL., P. Z. S. 1856, 285; 1859, 367 (Jalapa, E. Mexico).—SCL. & SALV., Ibis, 1859, 125, 173 (Guatemala).—CABAN. & HEINE, Mus. Hein. III, 1860, 92 (Jalapa; Porto Cabello; Guiana; Brazil).—LAWR., Ann. Lyc. N. Y. VII, 1861, 290 (Isth. Panama).—SALVIN, Ibis, 1866, 203 (Guatemala).—COUES & SENNETT, Bull. U. S. Geol. Surv. Terr. vol. iv, No. 1, Feb. 1878, 34 (Brownsville, Texas).

Nyctidromus affinis, GRAY, List B. Brit. Mus. II, 1844, 11, No. 2.

Nyctidromus derbyanus, GOULD, Icon. Av. II, 1838, pl. 2.—GRAY & MITCH., Genera B. I, 1849, 48.—BONAP., Consp. I, 1850, 62.

Caprimulgus grallarius, WIED, Mus. Lugd. (teste BONAP., Consp. I, 1850, 62).

Nyctidromus grallarius, BONAP., Consp. I, 1850, 62 (Brazil).—CASSIN, P. A. N. S. 1851, 179, 183; Catal. Caprim. Mus. Phila. Acad. 1851, 12 (Bogota).—BURM., Th. Bras. II, 1856, 392.

Caprimulgus laticaudatus, DRAPIEZ, Dict. Class. Hist. Nat. VI, 1824, 169 (teste CASSIN).

SP. CH.—*Adult male*: Wing, 6.75; tail, 6.75; tarsus, 1.10; middle toe, .80. Tarsus and heel-joint completely bare. Above, finely mottled brownish-gray, the crown with a central series of black, longitudinal dashes, the scapulars beautifully variegated with black and creamy-buff or ochraceous, in large, somewhat V-shaped, markings; wing-coverts with large terminal spots of creamy-buff or ochraceous. Basal portion (sometimes almost the basal half) of the exposed portion of the larger primaries white, including both webs, and forming a conspicuous patch; remainder of the quills uniform plain dusky. Outer tail-feather (on each side) nearly plain blackish throughout; next feather chiefly white, with the greater portion of the outer web blackish; third feather chiefly white, with the outer web margined more or less with dusky; four middle tail-feathers without any white, the ground color being mottled grayish, variegated by ragged, badly defined "herring-bone" blotches of blackish along the shaft. Lower parts deep buff or creamy-ochraceous, the throat crossed by a distinct collar of pure white, the remaining portions transversely barred or "rayed" with dusky, these bars wider apart posteriorly.

Adult female: Wing, 6.00–6.30; tail, 5.80–6.00. Generally similar to the male, but smaller, the colors less pure, the markings less sharply contrasted, and the white areas of the primaries and rectrices more restricted. General hue of the plumage decidedly more brownish; white patches on the primaries situated rather farther toward the ends of the feathers, occupying only the outer four (instead of six) quills; of smaller extent than in the male, and more or less tinged with ochraceous. White of the rectrices occupying only the terminal portion (from 0.75 of an inch to 1.75 inches) of the inner web of the second and third tail-feathers (counting from the outer), the blackish portions of these feathers broadly, though somewhat irregularly barred and mottled with ochraceous. White gular collar less distinct than in the male.

With a somewhat close general resemblance to the Whip-poor-will (*Caprimulgus vociferus*), this species may be at once distinguished by

the wholly naked tarsi, the white patch across the primaries, which are also destitute of ochraceous spots, by the much longer and differently marked tail and other features. It is, in fact, a far handsomer bird, and, not excepting even the "*Antrostomus*" *nuttalli*, is by far the most beautiful of the *Caprimulgidae* which occur in the United States. It is a species of very wide distribution, its range comprising the whole of the inter-tropical portions of America on both sides of the equator, with the exception of the West India Islands, from none of which it has thus far been recorded. It is subject to considerable variations of color, which have given rise to a number of synonyms, as may be seen by reference to the citations given above, but the variations seem to be of an individual and sexual nature, rather than geographical.—R. R.

This interesting addition to the avifauna of the United States proves to be a rather common summer visitor, arriving early in March, at least a month before any others of the family, and remaining as late, at least, as November 16, on which date I have taken two specimens. My first specimen was shot on the 1st of April, 1876, and its capture noted in the Bulletin of the Nuttall Ornithological Club, vol. 1, p. 88. Since that time, I have taken quite a number of specimens, and found several sets of eggs. The habits and eggs of this species, in addition to its anatomical characters, show its affinity with the Whip-poor-wills rather than the Nighthawks. It frequents shady thickets and copses (where these can be found), and when flushed dodges rapidly and silently among the bushes, but soon alights, only to repeat the short flight when again approached. The eggs are deposited in such a situation, usually at the foot of a bush; the parent, when started from her eggs, makes no attempt to decoy one away, but flying a few yards alights to watch the intruder, frequently raising herself on her legs and nodding in a curious manner, uttering at the same time a low, whining sound. Their notes are among the most characteristic night sounds of the Lower Rio Grande, and are constantly heard at evening during the summer months. They consist of a repeated whistle resembling the syllables *chew-chew-chew-chew-iche-e-e-e-ew*, much stress being laid upon the last, which is prolonged. The whole is soft and mellow, yet can be heard at a great distance. The preliminary *chews* vary somewhat in number, and late in the season are often omitted altogether. The eggs are a rich creamy-buff color, sparingly marked with a deeper shade of the same and with lilac.

Specimens average 1.25 by .92 inches.

On the 15th of May, 1876, I found a set of eggs near camp at Hidalgo, and on returning in about fifteen minutes to secure the parent, who had disappeared among the thickets, I found that she had removed the eggs, although they had not been touched. At least two pairs breed annually within Fort Brown, part of the reservation affording them the shade and shelter they always seek.

117. *Antrostomus carolinensis*, (Gmel.)

A few taken during the migrations.—(DRESSER, Ibis, 1865, 470.)

Proc. Nat. Mus. 78—10

Oct. 2, 1878.

118. *Antrostomus vociferus*, (Wils.)

Rather uncommon in spring and autumn.

119. *Chordeiles popetue*, (Vieill.)

Appears to be a rather rare visitant in spring and autumn.—(DRESSER, Ibis, 1865, 471.)

120. *Chordeiles popetue* var. *henryi*, Cassin.

Abundant during the summer months, arriving about the 1st of April, and leaving in September. Deposit their eggs near the edges of prairies. Specimens said by Ridgway to be smaller than typical *henryi*.—(*C. henryi*, DRESSER, Ibis, 1865, 471.)

121. * *Chordeiles acutipennis* var. *texensis*, Lawr.

Common summer visitor, arriving early in April. While var. *henryi* is usually found about prairies at some distance from houses, the present species is most plentiful just outside of Brownsville, and I have found several sets of eggs within the fort. These are usually deposited in exposed situations, among sparse chaparral, on ground baked almost as hard as brick by the intense heat of the sun. One set of eggs was placed on a small piece of tin, within a foot or two of a frequented path. The female sits close, and when flushed flies a few feet and speedily returns to its eggs. They make no attempt to decoy an intruder away. I have ridden up to within five feet of a female on her eggs, dismounted, tied my horse, and put my hand on the bird before she would move. This species is more strictly crepuscular than var. *henryi* or *popetue*, and is very seldom seen on the wing during the day. The notes are a mewling call, and a very curious call that is with difficulty described. It is somewhat like the distant and very rapid tapping of a large Woodpecker, accompanied by a humming sound, and it is almost impossible to tell in what direction or at what distance the bird is that makes the noise. Both these notes are uttered on the wing or on the ground, and by both sexes. The eggs vary considerably, but exactly resemble the surface on which they are placed. The ground color is usually clay: some are very sparingly dotted with brown; others mottled with light-brown and obscure lilac; others still are so thickly marbled with brown and lilac on a dark ground as to give them a granite-like appearance. They average 1.07 by .77.—(*C. texensis*, DRESSER, Ibis, 1865, 471.—SENNETT, B. Rio Grande, 34.)

122. *Chætura pelagica*, (Linn.)

Not uncommon during the migrations, arriving about March 20 and returning in September.

123. *Trochilus colubris*, Linn.

Abundant during the spring and autumn migrations, but I was not able to satisfy myself that any remained to breed or to pass the winter,

though I have seen them as late as December 7 and as early as March 9.—
(DRESSER, Ibis, 1865, 470.—SENNETT, B. Rio Grande, 35.)

124. *Amazilia fuscicaudata*.

- Trochilus fuscicaudatus*, FRASER, P. Z. S. Feb. 11, 1840, 17 (Chachapoyas, Peru).
Hylocharis fuscicaudatus, GRAY & MITCH., Genera B. I, 114, sp. 26.
Saucerottia fuscicauda, REICHENB., Troch. Enum. 1855, 8, t. 696, figs. 4552-53.
Trochilus riefferi, BOURCIEUR, Ann. Sci. Phys. et Nat. Lyon, 1843, 45; Rev. Zool. 1843, 103 (Fusagasuga, New Granada).
Amazilius riefferi, BONAP., Consp. I, 1850, 78; Rev. Zool. 1854, 254.—SCL., P. Z. S. 1856, 140; 1857, 16 (Bogota); 1859, 145 (Pallatanga, Ecuador).
Amazilia riefferi, REICHENB., Av. Syst. Nat. 1849, pl. 39; Aufz. der Colibr. 1853, 10; Trochil. Enum. 1855, 8, t. 775, figs. 4798-99.—GOULD, Monog. Trochilid. V, 1853, pl. 311.—SCL., P. Z. S. 1859, 145; 1860, 94 (New Granada), 283 (Babahoyo, Ecuador), 296 (Esmeraldas, Ecuador); Catal. Am. B. 1862, 314, No. 1878 (Coban, Vera Paz; Baranquilla, New Granada; Esmeraldas, Ecuador).—SCL. & SALV., Ibis, 1859, 130 (Guatemala); 1860, 40 (Ducñas, Guatemala); 1864, 365 (Panama); Nom. Neotr. 1873, 92 (Mexico; Central America; New Granada; Ecuador).—SALVIN, Ibis, 1860, 195, 270 (Coban, Vera Paz); P. Z. S. 1867, 156 (Veragua); Ibis, 1872, 320 (Nicaragua).—WYATT, Ibis, 1871, 378 (San Nicolas, New Granada; alt. 3,000 feet).
Polytmus riefferi, GRAY & MITCH., Genera B. I, 1849, 108, No. 72.—GRAY, Hand-list, I, 1869, 132, No. 16-0 (S. Mexico; Guatemala; "Andes."—Subg. *Amazili*).
Pyrhrophæna riefferi, CABAN. & HEINE, Mus. Hein. III, 1860, 36.—GOULD, Introd. Trochilid. 1861, 158 ("Southern Mexico, Guatemala, and along the Andes to Ecuador"); P. Z. S. 1870, 803 (Citado, Ecuador).—LAWR., Ann. Lye. N. Y. Oct. 23, 1865, 184 (Greytown, Nicaragua); ib. IX, 1868, 127 (Costa Rica); Bull. U. S. Nat. Mus. No. 4, 1876, 33 (Guénicovi, Isth. Tehuantepec).—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Ft. Brown, Texas, June, 1876; 2 specimens).
Eranna riefferi, HEINE, J. f. O. 1863, 188 (New Granada).
Trochilus aglaia, BOURC. & MULS., Ann. Soc. Phys. Sc. Lyon, 1846, 329; Rev. Zool. 1846, 316 (*hab. incog*).—MULS., Hist. Nat. Ois. Mouch. I, —, 319.
Polytmus aglaia, GRAY & MITCH., Genera B. I, 1849, 109, sp. 73.
Amazilius aglaia, BONAP., Consp. I, 1850, 71.
Saucerottia aglaia, REICHENB., Aufz. der Colibr. 1853, 10.
Chlorestes aglaia, REICHENB., Troch. Enum. 1855, 4.
Hemithylaca aglaia, CABAN. & HEINE, Mus. Hein. III, 1860, 38, note 13.
Ornismya amazili, DELATTRE, Écho du Monde Sav. No. 45, June 15, 1843, col. 1069.
Trochilus arsinoides, SAUC., in Mus. of Berlin" (GOULD).
Trochilus dubusi, BOURC., Soc. Agric. Lyon, 1852, 141.
Amazilia dubusi, REICHENB., Aufz. der Colibr. 1853, 10; Trochil. Enum. 1855, 8, pl. 778, figs. 4809-10.
Eranna dubusi, HEINE, J. f. O. 1863, 188 (Veragua; Guatemala; Costa Rica; S. Mexico).
Amazilius dubusi, BONAP., Rev. et Mag. de Zool. 1854, 254.—SCL., P. Z. S. 1856, 287; 1859, 386; 1860, 296.
Pyrhrophæna dubusi, CABAN. & HEINE, Mus. Hein. III, 1860, 36.
Eranna jucunda, HEINE, J. f. O. 1863, 188 (Babahoyo and Esmeraldas, Ecuador).
Pyrhrophæna sauris, CABAN. & HEINE, Mus. Hein. III, 1860, 38 (Cartagena, New Granada).
Eranna sauris, HEINE, J. F. O. 1863, 188 (Cartagena).

SP. CH.—Above metallic grass-green (varying to golden-green), more

bronzy on the crown and rump; longer upper tail-coverts cinnamon-rufous. Tail deep chestnut-rufous, the feathers tipped and edged for a greater or less distance from their ends with metallic greenish-bronze, glossed with purple; wing-coverts metallic green, like the back; rest of the wing uniform dusky slate, with a distinct violet purple gloss in certain lights. Side of the head bronzy-green, the lores bright cinnamon-rufous. Throat, jugulum, breast, and sides metallic green, most brilliant on the breast and jugulum, where bright emerald in certain lights, duller and more bronzy on the sides; throat-feathers grayish-white beneath the surface, this color showing wherever the feathers are disturbed. Abdomen pale mouse gray; crissum deep cinnamon-rufous; anal tufts and thighs cottony-white. Bill reddish at the base for a greater or less distance (pale brownish in the dried skin), the terminal portion blackish; feet blackish. Wing, 2.00-2.35; tail, 1.45-1.70; culmen, .70-.90. *Sexes alike in color.* Young similar to the adult, but with the plumage duller, the rump more extensively tinged with rufous and the forehead washed with rusty.

With very numerous specimens before me, representing various localities, from Eastern Mexico to Guayaquil, Ecuador, I am unable to discover any differences coincident with locality, even in specimens from the most remote districts. There is a considerable range of individual variation, involving the amount of blackness of the maxilla (some specimens having the upper mandible wholly blackish except the extreme base, while in others only the end is dark-colored), length of wing and bill, etc. These differences, however, appear to be purely individual, and not at all, so far as I can see, local.—R. R.

The occurrence of this species within our limits was noted in the Bulletin of the Nuttall Ornithological Club, vol. i, p. 88. I have nothing to add to the brief note there published. The specimen was captured by a soldier and brought to me. After describing the bird, I returned it to him, as he wished to keep it, but it escaped in a day or two.

Found from Southern Texas to Ecuador.

125. **Amazilia yucatanensis*.

Trochilus yucatanensis, CABOT, Pr. Boston Soc. N. H. 1845, 74. (Yucatan.)

Amazilia yucatanensis, GOULD, Monog. Trochilid. V, 1853, pl. 308.—MULS., Hist. Nat. Ois. Mouch. I, —, 295.

Pyrrhophæna yucatanensis, GOULD, Introd. Troch. 1861, 157.

Eranna yucatanensis, HEINE, J. f. O. 1863, 187 (Yucatan).

Amazilius cerviniventris, GOULD, P. Z. S. June 10, 1856, 150 (Cordova, Mexico).—SCL., ib. 287 (Cordova); 1857, 17.

Amazilia cerviniventris, GOULD, Monog. Troch. V, 1853, pl. 319 (Cordova).—SCL., Catal. Am. B. 1862, 314, No. 1877 (Tlacotalpam, S. Mexico).—SCL. & SALV., Nom. Neotr. 1873, 92 (Mexico).—BOUCARD, Catal. Avium, 1876, 350, No. 10,966 (Yucatan).—MERRILL, Bull. Nutt. Orn. Club, 11, Jan. 1877, 26 (Fort Brown, Texas, Aug. 17, 1876).—COUES & SENNETT, Bull. U. S. Geol. & Geog. Surv. Terr. vol. iv, No. 1, Feb. 1878, 35 (Brownsville, Texas).

Pyrrhophæna cervinirentis, CABAN. & HEINE, Mus. Hein. III, 1860, 36 (note).—GOULD, Introd. Trochilid. 1861, 157 (Cordova).
Eranna cervinirentis, HEINE, J. f. O. 1863, 187 (Cordova).
Polytmus cervinirentis, GRAY, Hand-list, I, 1869, 132, No. 1079 (Mexico.—Subg. *Amazili*).

SP. CH.—Above metallic grass-green, varying to golden-green, duller on the crown and more bronzy on the upper tail-coverts, which are sometimes slightly tinged on the edges with rufous. Tail cinnamon-rufous, the intermediæ more or less glossed with greenish-bronze (sometimes entirely of this color); the other feathers bronze terminally, this color usually following the edge for a greater or less distance from the tip. Wing-coverts metallic grass-green, like the back; remainder of the wing uniform brownish-slate, with a very faint violet-purple gloss in certain lights. Throat, jugulum, and sides of the head and breast brilliant metallic-green, almost emerald in certain lights, the feathers dull white beneath the surface, thus breaking the continuity of the green, especially on the throat, where the feathers are broadly tipped with green. Rest of lower parts pale fawn color, or dilute cinnamon-buff, deepest on the crissum; sides glossed with bronze-green; anal tufts and thighs cottony white. Bill reddish (light brown in the dried skin), the terminal third blackish. Feet dusky. Wing, 2.15–2.20; tail, 1.50–1.60, depth of its fork about 0.20; culmen, 0.80. *Sexes alike in coloration.*

HAB.—Eastern Mexico, from the Rio Grande Valley (United States side) to Yucatan.

The two examples in the National Collection (No. 24,873, Jalapa, and 70,949, Fort Brown, Texas) differ in some minor details of coloration. Thus, the former has the middle pair of tail-feathers entirely greenish-bronze, except a very small space on each web concealed by the longer upper tail coverts; the bronzy ends of the other feathers are distinctly glossed with dark purple, and the outer pair of feathers have scarcely a trace of bronze at their ends. The latter specimen, on the other hand, has the basal two-thirds of the intermediæ wholly rufous, the bronzy ends of the other feathers destitute of a purple gloss, and the outer pair of feathers very distinctly tipped with bronze and edged for their whole length with a darker shade of the same color. These differences, however, are doubtless only individual, or, possibly, sexual. The Fort Brown specimen is a little the larger, but the difference in size is very slight. Neither has the sex marked.

I have not seen a specimen of the so-called "*yucatanensis*, Cabot", but follow Mr. Elliot (MSS.) in considering it the same as the bird afterwards described by Mr. Gould as *cervinirentis*.—R. R.

This Hummer, also new to the avifauna of the United States, and heretofore known only from Mexico, was first taken on the 17th of August, 1876, and its capture noted in the Bulletin of January, 1877, p. 26. It proves to be an abundant summer visitor, and I have nowhere found

it so abundant as on the military reservation at Fort Brown. Here it seems perfectly at home among the dense, tangled thickets, darting rapidly among the bushes and creeping vines, and is with difficulty obtained. A rather noisy bird, its shrill cries usually first attract one's attention to its presence. A Hummer's nest, undoubtedly made by this species, was found in September, 1877, within the fort. It was placed on the fork of a dead, drooping twig of a small tree on the edge of a path through a thicket: it was about seven feet from the ground, and contained the shrivelled body of a young bird. The nest is made of the downy blossoms of the tree on which it is placed, bound on the outside with cobwebs, and rather sparingly covered with lichens. Internally, it is somewhat less than one inch in depth by one-half inch in diameter. The external depth is one and one-half inch.

NOTE.—Besides these two species of Hummers actually taken, I have seen two others that are certainly new to our avifauna, but have not been able to capture them. One of these is a large, green species, with a long tail; the other, a very small bird, of a deep purplish-brown color.

126. *Geococcyx californianus*, (Less.)

This curious bird is abundant, and is a resident. Its food consists of insects, field-mice, small snakes, and snails. Of these latter, one species (a variety of *Bulimulus alternatus*) is very common, passing the dry season on bushes and cacti, and of this the bird is very fond. Quite large piles of the broken shells are constantly to be seen along the roadsides about some fallen branch on which the bird breaks them. As a rule, the "road-runner" is a silent bird, but occasionally it is heard to utter one of two notes. One is a "kook-kook kook kook", much like the call of the Yellow-billed Cuckoo, but louder, and usually heard during the breeding season. The other is a note of alarm or anger: it is a low, growling sound, accompanied by a chattering of the bill. The nests are usually placed in low, thorny bushes, and are thick, clumsy structures, with but a slight depression for the eggs. The latter appear to be deposited at intervals of several days, and a perfectly fresh egg is often found with one on the point of hatching. I have never found more than four eggs or young in one nest.—(DRESSER, *Ibis*, 1865, 466.—SENNETT, *B. Rio Grande*, 36.)

127. * *Coccyzus americanus*, (Linn.)

Not uncommon summer visitor; breeding rather plentifully.—(DRESSER, *Ibis*, 1865, 467.—SENNETT, *B. Rio Grande*, 38.)

128. * *Picus scalaris*, Wagler.

Common resident. In notes and habits, this little bird is so like the Downy Woodpecker that there is little to be said about it. Eighteen perfectly identified eggs now before me average .81 by .64, which is much less than the measurements given in Baird, Brewer, and Ridgway, II, 519.—(DRESSER, *Ibis*, 1865, 468.—SENNETT, *B. Rio Grande*, 38.)

129. *Hylotomus pileatus*, (Linn.)

Late in May, 1876, I saw one specimen near Santa Maria, and have seen several holes that from their size were probably made by this bird.*—(DRESSER, *Ibis*, 1865, 469.)

MEM.—Perhaps this was a Mexican species.

130. * *Centurus aurifrons*, (Wagl.)

This handsome Woodpecker is found abundantly, perhaps rather more so than *P. scalaris*. Its habits and mode of nesting do not differ from those of other Woodpeckers of the same size. In places where there is only low chaparral, the poles of the government telegraph line are completely riddled by this bird. The eggs are usually four in number, and are rather fragile; before they are blown, they are a beautiful shade of pink. Seven specimens average 1.03 by .76.—(SENNETT, B. Rio Grande, 39.—*C. flaviventris*, DRESSER, *Ibis*, 1865, 469.)

131. *Strix flammea* var. *pratincola*, Bon.

This Owl seems to be a rather common resident. Near Hidalgo it breeds in holes in the banks of the Rio Grande, and in Brownsville a few nest in ruined buildings.—(*S. pratincola*, DRESSER, *Ibis*, 1865, 330.—*S. flammea americana*, SENNETT, B. Rio Grande, 39.)

132. *Asio accipitrinus*, (Pall.)

During the latter part of January, 1877, a small gathering of these Owls frequented a patch of tall grass in an open field near Brownsville.—(*Brachyotus cassini*, DRESSER, *Ibis*, 1865, 330.)

133. *Scops asio* var. *maccalli*, Cass.

Common resident. Near Hidalgo, on May 6, 1876, I captured a female of this race on her nest in an old hollow stump about five feet from the ground. There were two eggs, nearly hatched, placed on a few chips at the bottom of the hole: these were of a dull white color with yellowish stains, and measure 1.40 by 1.15 and 1.39 by 1.13. The parent made an interesting pet for a few days, but finally escaped from my tent with one of the pegs to which it had been tied.—(*S. asio maccalli*, SENNETT, B. Rio Grande, 39.—*S. maccalli*, DRESSER, *Ibis*, 1865, 330.)

134. *Bubo virginianus*, (Gmel.)

Probably resident. I have seen them occasionally in deep woods, and on one occasion in a perfectly open prairie, miles from timber of any size.—(SENNETT, B. Rio Grande, 39.)

135. *Speotyto cunicularia* var. *hypogæa*, (Bon.)

The Burrowing Owl is rather abundant during the winter months, but I do not think that any remain to breed.—(*Athene hypogæa*, DRESSER, *Ibis*, 1865, 330.)

* This may possibly have been the Mexican species *H. scapularis* (Vigors).—R. R.

136. *Falco communis* var. *nævius*, Gmel.

Rather common on the prairies near the coast during winter.—(*F. anatum*, DRESSER, Ibis, 1865, 323.)

137. *Falco fusco-cærulescens*, Vieill.

Until recently but two specimens of this beautiful Falcon had been taken within the United States, one in New Mexico, the other in Texas.

During 1876 and 1877, I had occasionally seen a Hawk that I felt confident was of this species, but did not succeed in obtaining any specimens.

On the 16th of June of the latter year, I found a nest placed in the top of a low Spanish bayonet growing in Palo Alto prairie, about seven miles from Fort Brown. After waiting a long time, I wounded the female, but she sailed off over the prairie and went down among some tall grass, where she could not be found: the male did not come within gunshot, though he twice rose from the nest on my approach. The nest was a slightly depressed platform of twigs, with a little grass for lining. The eggs, three in number, were rotten, though containing well-developed embryos. They measure 1.81 by 1.29, 1.77 by 1.33, and 1.88 by 1.33 respectively. This set is now in Dr. Brewer's collection.

On May 7, 1878, a second nest was found within one hundred yards of the one just mentioned, and the parent secured. The nest in situation and construction was precisely like the other, except that the yucca was higher, the top being about twelve feet from the ground. The eggs were three in number, all well advanced but one, with a dead embryo. They measure 1.78 by 1.34, 1.82 by 1.29, 1.73 by 1.32; the ground-color is white, but so thickly dotted with reddish-brown as to appear of that color; over these are somewhat heavier markings of deeper shades of brown.

A single egg, without history, sent to me from Hidalgo, Texas, by Dr. S. M. Finley, U. S. A., measures 1.73 by 1.36: it is probably of this species, but its general appearance is much more reddish than either of the above sets.

Since becoming more familiar with the habits of this Falcon, I have several times observed it among yuccas and prickly pears on open prairies, and it is probably a not very uncommon summer resident in such places in this vicinity.

NOTE.—The egg referred to by Dr. Merrill as without history presents a very interesting problem, only to be solved when eggs precisely similar can be found with their parentage satisfactorily established. It may be an egg of *femoralis*, but is quite as likely to be something else. It resembles in the color and peculiarities of its markings no eggs of the *femoralis* I have ever seen. It has neither the beautiful vandyke-brown markings of the egg figured in my Oölogy, nor any of the more abundant raw-sienna dottings found in both the speci-

mens from the Pampas, and which is the only color present in the specimens identified by Dr. M. Instead, it is marked all over its surface with handsome spots and blotches of a deep reddish-buff, almost cinnamon in shade, completely obscuring the ground. Excepting in size, it most resembles an egg of *Hierofalco islandicus*.—T. M. B.

138. *Falco columbarius*, Linn.

Not uncommon during winter.—(DRESSER, Ibis, 1865, 323.—SENNETT, B. Rio Grande, 42.)

139. *Falco sparverius*, Linn.

Abundant from about the middle of September until the early part of April. All the specimens obtained were var. *sparverius*.—(SENNETT, B. Rio Grande, 42.—*Tinnunculus s.*, DRESSER, Ibis, 1865, 323.)

140. **Polyborus cheriway*, (Jacq.)

A common resident, but more abundant in winter than in summer. This seems to be due to a partial migration, from the north, of birds in immature plumage, for the number of mature individuals does not seem to vary. I do not think that the perfect plumage is acquired for at least two years. I have but little to add to the many accounts already given of this bird, except to say that, at times at least, it is more active than some of the descriptions would lead one to infer. I have seen a Caracara chase a jackass-rabbit for some distance through open mesquite chaparral, and while they were in sight the bird kept within a few feet of the animal and constantly gained on it, in spite of its sharp turns and bounds. If one bird has caught a snake or field-mouse, its companions that may happen to see it at once pursue, and a chase follows very different from what is seen among true Vultures. The nests are bulky platforms of small branches, with a slight depression lined with fine twigs, roots, and grasses, or sometimes altogether without lining: they are placed in trees or on the tops of bushes, at no great height from the ground. Both sexes incubate. I have not found more than two eggs in one nest, and these are laid at an interval of three or four days. Eleven eggs average 2.28 by 1.84. The ground-color is a deep chocolate or reddish-brown, more or less thickly covered with several darker shades of the same.—(*P. tharus*, DRESSER, Ibis, 1865, 329.—*P. tharus auduboni*, SENNETT, B. Rio Grande, 42.)

141. *Elanoides forficatus*, (Linn.)

This beautiful bird I have observed on but few occasions, and do not think that it breeds in this immediate vicinity. Nothing can be more graceful than its movements when pursuing insects, and for such a large bird it is very active.—(SENNETT, B. Rio Grande, 42.—*Nauclerus furcatus*, DRESSER, Ibis, 1865, 325.)

142. *Elanus leucurus*, (Vieill.)

Seen on a few occasions, but is rare.

143. *Circus hudsonius*; (Linn.)

Probably the most common species of Hawk during the winter months, arriving in September and leaving in April. A large proportion are in immature plumage.—(DRESSER, Ibis, 1865, 328.—*C. cyaneus hudsonius*, SENNETT, B. Rio Grande, 40.)

144. *Nisus fuscus*, (Gmel.)

Found sparingly in winter.—(*Accipiter f.*, DRESSER, Ibis, 1865, 324.)

145. *Nisus cooperi*, (Bon.)

Like the last.—(*Accipiter c.*, DRESSER, Ibis, 1865, 323.—SENNETT, B. Rio Grande, 42.)

146. *Antenor unicinctus* var. *harrisi*, (Aud.)

Resident and quite abundant. In its habits, this bird resembles the Caracara Eagle, but is not so active. The nests are hardly distinguishable in situation or construction, and the two eggs are also deposited at an interval of three or four days. Six eggs average 2.08 by 1.62; they are dull bluish or yellowish-white, faintly stained with yellowish-brown.—(*Craxirex unicinctus*, DRESSER, Ibis, 1865, 329.—*Buteo unicinctus harrisi*, SENNETT, B. Rio Grande, 42.)

147. *Buteo pennsylvanicus*, (Wils.)

Uncommon winter visitor.—(DRESSER, Ibis, 1865, 325.—SENNETT, B. Rio Grande, 43.)

148. *Buteo swainsoni*, Bon.

Occurs sparingly in winter.—(DRESSER, Ibis, 1865, 324.)

149. *Buteo borealis*, (Gmel.)

A pair seen January 10, 1877, near Fort Brown, seemed to approach var. *krideri* in the extent and purity of white beneath, although the subterminal band of black on the tail was very distinct. The birds sailed several times quite near me, and I had a very good view of them.—(DRESSER, Ibis, 1865, 324.)

150. *Buteo harlani*, Aud.

Early in November, 1876, I observed a single specimen of this species sailing in easy circles at no great distance from the ground; but, not having my gun, I was unable to secure it.—(DRESSER, Ibis, 1865, 324.)

151. *Buteo albicaudatus*.—The White-tailed Buzzard.

Aquila coliblanca, AZARA, Apunt. I, 1803, 69.

Buteo albicaudatus, VIEILL., Nouv. Dict. IV, 1816, 477 (*ex AZARA. l. c.*).—STRICKL., Orn. Syn. I, 1855, 35.—SALVIN, P. Z. S. 1870, 215 (Veragua).

Tachytriorchis albicaudatus, SHARPE, Cat. Acc. Brit. Mus. I, 1874, 162.

Craxirex albicaudatus, RIDGW., Pr. Ac. Nat. Sci. Phila. 1875, 92.

Buteo (Craxirex) albicaudatus, RIDGW., *l. c.* 98 (monographic).

Spizaetus leucurus, VIEILL., Nouv. Dict. XXXII, 1819, 59.

Buteo leucurus, LAFR., Rev. Zool. 1849, 100.

Falco pterocles, TEMM., Pl. Col. I, 1823, pls. 56 (*adult*) and 139 (*young*).

Buteo pterocles, LESS., Man. I, 1828, 103.—GRAY, Gen. B. I, 1849, 12; Handlist, I, 1869, 8.—CABAN., in Schomb. Guiana, III, 1848, 739.—KAUP, Contr. Orn. 1850, 75 (subgen. *Tachytriorchis*).—BURM., Th. Bras. II, 1855, 49.—SCHLEG., Mus. P.-B. Buteones, 1863, 13; Rev. Acc. 1873, 110.—PELZ., Orn. Bras. 1871, 3, 396.—SCL. & SALV. P. Z. S. 1870, 782 (Andes of Merida, Venezuela); Nom. Neotr. 1873, 119 (Mexico to Brazil).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 41 (Tapan, S. Mexico, July).*

Tachytriorchis pterocles, KAUP, Säug. Vög. 1844, 123.—BOXAP., Consp. I, 1850, 17.

Buteo albicauda, LESS., Traité, 1831, 81, pl. 15, fig. 2.—PUCHÉAN, Rev. et Mag. Zool. 1850, 214.

Buteo tricolor, HARTL., Ind. Azara, 1847, 1 (*nee* D'ORB.)

"*Buteo erythronotus*", SCL., P. Z. S. 1859, 389 (Oaxaca) (*nee* KING).—SALVIN & SCL., Ibis, 1860, 401 (Antioquia, Guatemala).—LAWR., Ann. Lyc. N. Y. IX, 1868, 133 (San José and San Antonio, Costa Rica).

"*Buteo harlani*" (supposed young), SHARPE, Cat. Acc. Brit. Mus. I, 1874, 191 (= *juv.*†).

HAB.—The whole of Middle America, north to the Lower Rio Grande Valley in Texas (on the eastern side), Colima (west coast), and the City of Mexico (central plateau); Eastern South America as far as Paraguay.

Diagnosis.—Wing, 14.50–18.00; tail, 7.70–10.50; culmen, .95–1.05; tarsus, 3.30–3.70; middle toe, 1.55–1.80. Form: Third quill longest; first intermediate between sixth and eighth. Tail even in adult, slightly rounded in young. Color: Adult, tail white (the lateral feathers much tinged with ash), crossed by a broad subterminal band of black; the white portion crossed by faint lines or narrow bars of plumbeous. Above dark plumbeous; rump and lower parts pure white; throat plumbeous-black or bluish-plumbeous. Flanks, rump, and lining of the wing usually faintly barred with ashy, dusky, or rufous. ♂: Lesser wing-coverts with a restricted patch of rufous on the anterior portion; longer scapulars strongly tinged with rufous. ♀: Rufous patch on lesser wing-covert region extended over nearly the whole of its area; longer scapulars scarcely tinged with rufous. Young: Tail hoary-grayish (the inner webs mostly white), growing gradually darker terminally, and passing narrowly into dull whitish or rufous at tip; crossed by numerous narrow and very indistinct bars of darker, these growing gradually obsolete towards the base.‡ General color brownish-black, the lower parts more or less variegated (most conspicuously on the posterior portions and on middle of the breast) with ochraceous or whitish.

Remarks.—The identity of specimens of the two plumages described in the diagnosis as "adult" and "young" is proven by specimens in which part of the tail-feathers are of one plumage and part of the other. Such a specimen is in Mr. Lawrence's collection from the City of Mexico.

The older individuals in the immature dress are colored as follows:—Tail hoary ash, growing darker terminally, and passing narrowly into

* Iris hazel-brown; cere greenish; feet yellow.

† *Fide* SALVIN, Ibis, October, 1874, 314.

‡ These bars are sometimes entirely obsolete on the outer webs.

brownish-white at the tip—the inner webs mostly white; the terminal half with just discernible obscure bars of darker, these becoming gradually obsolete on the basal half; sometimes they are entirely obsolete for the full length of the outer webs. Upper tail-coverts pure white, usually immaculate, but sometimes barred; inner webs of primaries ashy, the two or three outer ones more whitish, and sometimes barred with dusky. In males, the middle of the breast, the tibiæ, and crissum are usually ochraceous, irregularly spotted with brownish-black.

The darker-colored individuals in this stage are distinguishable from the dark examples of the young of *B. swainsoni* only by the very much stouter and longer tarsi.

The adults vary but little. The white of the jugulum usually reaches forward medially into the plumbeous of the throat, and in one (♂ ad., Tehuantepec, Mexico; Sumichrast) it extends—interruptedly, however—to the chin. Another male from the same locality has the scapulars almost entirely rufous, with black shaft-streaks. The white of the lower parts in the adult is of a pureness and continuity strikingly characteristic of this species.

A very young specimen from Paraguay has the tail more brownish, more distinctly barred, and more ochraceous on the tip; the upper tail-coverts are ochraceous, marked with broad crescentic bars of blackish, and the upper parts generally are variegated with ochraceous.

The specimen collected by Dr. Merrill (No. 74,464) is an adult male in fine plumage. It agrees strictly with Mexican examples of corresponding sex and age. Dr. M. furnishes the following notes on this specimen:—"Length, 19.20; extent, 47.40; wing, 15.30; tail, 7.20. Feet and legs yellow; cere greenish yellow; tip of bill dark, basal half bluish green; iris brown."

Material examined.—United States National Museum, 13; Museum of the Academy of Natural Sciences of Philadelphia, 6; Museum of G. N. Lawrence, Esq., 1; other specimens,* 4. Total number of specimens examined, 24.

Measurements.

Sex and age.	Wing.	Tail.	Culmen.	Tarsus.	Middle toe.	Specimens.
♂ ad.	16.30—16.70	7.50—9.00	.95—1.10	3.30—3.55	1.60—1.80	5
♂ juv.	14.50—16.75	8.60—8.75	1.02—....	3.30—3.60	1.55—1.65	3
♀ ad.	17.75—....	8.25—....	1.00—....	3.60—....	1.75—....	1
♀ juv.	17.00—17.75	8.40—10.30	.95—1.05	3.30—3.70	1.60—1.80	3

This fine Hawk is a rather common resident on the extensive prairies near the coast, especially about the sand ridges that are covered with yucca and cactus. Its habits appear to be like those of the allied species of Prairie Hawks. On the 2d of May, 1878, I found two nests, each

* These are specimens collected on the Isthmus of Tehuantepec by Prof. F. Sumichrast, and not entered in the Register of the National Museum.

placed in the top of a yucca growing in Palo Alto prairie, about seven miles from the fort. The nests were not more than eight feet from the ground, and were good-sized platforms of twigs, with scarcely any lining. While examining these nests, the parents sailed in circles overhead, constantly uttering a cry much like the bleating of a goat. Each nest contained one egg. The first was quite fresh, and measures 2.35 by 1.91. It is of a dirty-white color, with a few reddish blotches at the smaller end. The second egg was partly incubated. It resembles the first one, but the reddish blotches are rather sparsely distributed over the entire egg. It measures 2.35 by 1.85.

152. *Rhinogryphus aura*, (Linn.)

Very common at all seasons. Deposits its eggs on the ground, sometimes on the open prairie; at others, in more or less dense chaparral.* —(*Cathartes a.*, DRESSER, Ibis, 1865, 322.—SENNETT, B. Rio Grande, 44.)

153. *Catharistes atratus*, (Bart.)

About as common as the preceding species, and, like it, breeds on the ground. I have not heard of either species building in trees here, as they are said to do in other parts of Texas.—(*Cathartes a.*, DRESSER, Ibis, 1865, 322.—SENNETT, B. Rio Grande, 45.)

154. *Columba flavirostris*, Wagl.

This large and handsome Pigeon is found in abundance during the summer months, arriving in flocks of fifteen or twenty about the last week in February. Though not very uncommon about Fort Brown, it is much more plentiful a few miles higher up the river, where the dense woods offer it the shade and retirement it seeks. Three nests found in a grove of ash-trees, on the bank of the Rio Grande, near camp at Hidalgo, were frail platforms of twigs, such as are usually built by other Pigeons. Each contained one egg. It would appear from Mr. Sennett's observations, which are more complete than mine, that this Pigeon rarely, if ever, lays more than one egg. These are of a pearly whiteness, and average 1.50 by 1.08. Both sexes incubate. A perfectly fresh specimen has the soft parts as follows:—Terminal half of bill pale horn-color; basal half light pink; margin of eyelids and a ring near its base deep pinkish-red; iris bright orange-yellow, lighter yellow at pupillary margin; legs and feet vivid purplish-red.—(DRESSER, Ibis, 1866, 23.—SENNETT, B. Rio Grande, 45.)

155. * *Melopelia leucoptera*, (Linn.)

Very common during the summer months. The nests as a rule are smaller and more frail than those of the Carolina Dove, and the eggs have a decided creamy tinge, which is rarely lost after blowing, at least

* I have looked carefully for *R. burrovianus*, but without success, although Mr. Dresser (Ibis, 1865, p. 322) states that he has seen it on Palo Alto prairie, not more than seven miles from the fort.

not for months. Thirty-four eggs average 1.17 by .88; extremes 1.30 by .95 and 1.05 by .80. The note is a deep, sonorous *coo*, frequently repeated, and heard at a great distance.—(DRESSER, Ibis, 1866, 24.—SENNETT, B. Rio Grande, 47.)

156. * *Zenædura carolinensis*, (Linn.)

Although this species is found throughout the year, it is decidedly uncommon during the winter months; probably not more than 5 per cent. or less remain at that season. One habit noticed here I have not seen mentioned before,—that of occasionally occupying old nests of the Great-tailed Grackle for their second brood.—(DRESSER, Ibis, 1866, 24.—SENNETT, B. Rio Grande, 47.)

157. * *Chamæpelias passerina*, (Linn.)

Quite abundant, particularly in summer. The small and rather compact nests are placed on the horizontal branch of a stout bush or tree, and are lined with a few straws. On one occasion, I found the eggs in a roughly made nest on the ground on the edge of a prairie.—(DRESSER, Ibis, 1866, 24.—SENNETT, B. Rio Grande, 48.)

158. * *Æchmoptila albifrons*.

Z[enaida] amabilis, McCALL, Pr. Ac. Nat. Sci. Phila. 1851, 220 (between Matamoros and Camargo).

"*Leptoptila albifrons*, GRAY, List Spec. Brit. Mus. p. 15."—BONAP., Consp. II, 1855, 74.—SCL., P. Z. S. 1859, 363 (Jalapa); 1860, 289 (Babahoyo, Ecuador); 1864, 178 (City of Mexico); 1870, 838 (Honduras).—SCL. & SALV., Ibis, 1859, 222 (Dueñas, Guatemala); P. Z. S. 1864, 370 (Guatemala; Panama); 1865, 60 (Mexico; Guatemala); 1870, 838 (coast of Honduras); Nom. Neotr. 1873, 133.—LAWR., Pr. Boston Soc. 1871, — (Tres Marias Islands, W. Mexico; common. Vulg.: "*Paloma*"); Mem. Boston Soc. II, 1874, 305 (Mazatlan; Tres Marias; habits); Bull. U. S. Nat. Mus. No. 4, 1876, 44 (Isth. Tehuantepec. "Iris orange; bill black; bare orbital space bluish; feet carmine").—COUES, Bull. Nutt. Orn. Club, II, July, 1877, 82 (Hidalgo, Texas, April 18, 1877; not uncommon; breeding).

Æchmoptila albifrons, COUES & SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. vol. iv, No. 1, 1878, 49 (Hidalgo, Texas).

Peristera albifrons, BONAP., Consp. II, 1855, 74 (Mexico; "Cuba"; "Columbia"; "Carthagera").—GRAY, Hand-list, II, 1870, 242 (Mexico. Subg. *Leptotila*).

"*Peristera brachyptera*, GRAY, MSS." (SCLATER).

[A good description of this species having already been given by Dr. Coues in Mr. Sennett's paper, I give here only a list of references, mostly additional to those already published.—R. R.]

This Pigeon is not rare in the vicinity of Fort Brown, but is shy and not very often seen. I can give nothing very definite in regard to its habits. The only nest I have found was taken on June 8, 1878, on the government reservation. It was about seven feet from the ground, supported by the dense interlacing tendrils of a hanging vine growing on the edge of a thicket. The eggs, two in number, were quite fresh.

They measure 1.16 by .86 and 1.19 by .89. They are much like eggs of *M. leucoptera*, but have a strong olive-buff instead of a creamy-buff tinge.

159. *Ortalia vetula* var. *maccalli*, Baird.

The Chachalac, as the present species is called on the Lower Rio Grande, is one of the most characteristic birds of that region. Rarely seen at any distance from woods or dense chaparral, they are abundant in those places, and their hoarse cries are the first thing heard by the traveller on awaking in the morning. During the day, unless rainy or cloudy, the birds are rarely seen or heard; but shortly before sunrise and sunset, they mount to the topmost branch of a dead tree, and make the woods ring with their discordant notes. Contrary to almost every description of their cry I have seen, it consists of three syllables, though occasionally a fourth is added. When one bird begins to cry, the nearest bird joins in at the second note, and in this way the fourth syllable is made; but they keep such good time that it is often very difficult to satisfy one's self that this is the fact. I cannot say certainly whether the female utters this cry as well as the male, but there is a well-marked anatomical distinction in the sexes in regard to the development of the trachea. In the male, this passes down outside the pectoral muscles, beneath the skin, to within about one inch of the end of the sternum; it then doubles on itself, and passes up, still on the right of the keel, to descend within the thorax in the usual manner. This duplicature is wanting in the female. These birds are much hunted for the Brownsville market, though their flesh is not particularly good, and the body is very small for the apparent size of the bird. Easily domesticated, they become troublesome familiar, and are decided nuisances when kept about a house. Beyond Ringgold Barracks, this species is said to become rare, and soon to disappear; and it probably does not pass more than fifty miles to the north of the Rio Grande. The nests are shallow structures, often made entirely of Spanish moss, and are placed on horizontal limbs a few feet from the ground. The eggs, commonly three in number, are about the size and shape of common hens' eggs; they are of a buffy-white, and are roughly granulated; they average about 2.18 by 1.55.—(*O. maccalli*, DRESSER, Ibis, 1866, 24.—*O. vetula*, SENNETT, B. Rio Grande, 50.)

160. *Meleagris gallopavo*, Linn.

Found in abundance in all suitable localities, but not in the immediate vicinity of the fort; birds taken here present the characters of var. *mexicana* well developed. Two eggs taken near Hidalgo by Mr. G. B. Sennett, and presented to me, are quite unlike; one measures 2.41 by 1.84, and in color and markings is like a typical egg of the domestic turkey; the other egg, 2.33 by 1.72, is of a pale creamy-white, the spots being few and very pale.—(DRESSER, Ibis, 1866, 25.—SENNETT, B. Rio Grande, 53.)

161. *Cupidonia cupido* var. *pallidicincta*, Ridgw.

I am informed by a person perfectly familiar with the bird that the Prairie Chicken is occasionally seen on the prairies about Miradores

ranch, which is about thirty miles north of the fort and a few miles from the coast. This is probably about the southernmost point in the range of the bird.—(*C. cupido*, DRESSER, Ibis, 1866, 26.)

162. **Ortyx virginiana* var. *texana*, Lawr.

The Texan Quail is very common, and in its habits resembles the Eastern Quail in all respects, except that it does not lie well to a dog. They are with difficulty flushed, but run at once into chaparral, from which it is almost impossible to dislodge them. The only nest I succeeded in finding was at the foot of a small stump, surrounded by a small, but dense, growth of offshoots; the nest was rather elaborately built of grasses, and was well domed. On the 21st of May, it contained sixteen fresh eggs. These average 1.15 by .93, the extremes being 1.18 by .95 and 1.12 by .92. Four odd eggs from different nests are rather larger than this average.—(*O. texanus*, DRESSER, Ibis, 1866, 27.—*O. virginiana texana*, SENNETT, B. Rio Grande, 53.)

163. *Callipepla squamata*, (Vigors.)

This beautiful Partridge is found in great abundance at Ringgold Barracks about 120 miles from Fort Brown, but does not come very much farther down the river. Hidalgo is about the limit of their range in this direction, though on September 13, 1877, I killed one within two miles of the fort. This was one of a covey and the only one flushed, and I did not recognize it until I picked it up; the others were not distinctly seen, but were probably of the same species.—(DRESSER, Ibis, 1866, 28.)

164. *Ægialitis vocifera*, (Linn.)

Common resident.—(DRESSER, Ibis, 1866, 33.—SENNETT, B. Rio Grande, 53.)

165. *Ægialitis wilsonia*, (Ord.)

Resident, breeding rather abundantly along the coast.—(DRESSER, Ibis, 1866, 34.)

166. *Hæmatopus palliatus*, Temm.

Breeds on Padre and Brazos Islands.—(DRESSER, Ibis, 1866, 34.—SENNETT, B. Rio Grande, 53.)

167. *Streptilas interpres*, (Linn.)

The Turnstone is found on the coast and adjacent lagoons throughout the year, and I feel confident that it breeds in spite of the latitude. During May and June pairs in full plumage may daily be seen in the same localities.—(DRESSER, Ibis, 1866, 34.—SENNETT, B. Rio Grande, 54.)

168. *Recurvirostra americana*, Gm.

Common during winter, a few pairs remaining to breed.—(DRESSER, Ibis, 1866, 35.—SENNETT, B. Rio Grande, 54.)

169. *Himantopus mexicanus*, (Müller.)

Common resident. Breeds in the marshes about the middle of May, making its nests on wet grassy flats and laying three or four eggs. The nests are platforms of straw and grasses, often wet, and barely keeping the eggs out of the water. Twenty-two eggs average 1.75 by 1.19, the extremes being 1.88 by 1.25 and 1.60 by 1.10.—(*H. nigricollis*, DRESSER, Ibis, 1866, 35.—SENNETT, B. Rio Grande, 54.)

170. *Gallinago wilsoni*, (Temm.)

Plentiful during the winter, though the great majority go farther south. The time of their arrival in the autumn is uncertain. In 1876, the first were shot on the 18th of September, and they soon became abundant; this was said to be at least a month earlier than usual. In 1877, the main flight arrived on the 28th of November, during a cold and wet "norther".—(DRESSER, Ibis, 1866, 36.)

171. *Macrorhamphus griseus*, (Gmel.)

Common from September until April.—(DRESSER, Ibis, 1866, 36.)

172. *Tringa alpina* var. *americana*, Cass.

On May 16, 1877, I found the Red-backed Sandpiper rather common about some lagoons in the salt marshes; the males were in full breeding plumage.

173. *Tringa bairdii*, Coues.

Two females taken March 30, 1876, on a sand-bar in the river.

174. *Tringa maculata*, Vieill.

Common during the migrations, returning in the latter part of July. They do not seem to pass the winter.—(DRESSER, Ibis, 1866, 36.—SENNETT, B. Rio Grande, 55.)

175. *Tringa fuscicollis*, Vieill.

Common in winter.

176. *Tringa minutilla*, Vieill.

Common in winter.—(*Tringa wilsoni*, DRESSER, Ibis, 1866, 37.)

177. *Calidris arenaria*, (Linn.)

Common in winter on Padre and Brazos Islands, where I have also seen it in July.

178. *Ereunetes pusillus*, (Linn.)

Common in winter.—(*E. petrificatus*, DRESSER, Ibis, 1866, 37.)

179. *Micropalama himantopus*, (Bonap.)

October 13, 1877.—(DRESSER, Ibis, 1866, 37.)

180. *Actiturus bartramius*, (Wils.)

This species arrives in small flocks about the second or third week in March, and is found abundantly on the grassy prairies. On its arrival

in spring, it is in poor condition, and soon goes farther north, though a few linger until about May 10. Late in July some reappear, and by the first of September they are abundant; by the middle of this month, they begin to leave, and few are seen or heard after the first week in October.—(DRESSER, *Ibis*, 1866, 38.—SENNETT, B. Rio Grande, 55.)

181. *Tryngites rufescens*, (Vieill.)

The Buff-breasted Sandpiper is found in the same localities and at the same seasons as the Upland Plover, which it closely resembles in habits, but is much less shy and suspicious.—(DRESSER, *Ibis*, 1866, 39.)

182. *Limosa fedoa*, (Linn.)

Taken in spring and autumn.—(DRESSER, *Ibis*, 1866, 39.—SENNETT, B. Rio Grande, 55.)

183. *Symphemia semipalmata*, (Gmel.)

Breeds rather plentifully in suitable localities. Four eggs, somewhat advanced in incubation, were found on May 2, 1877, placed on a few grass-blades under a weed in a dry part of the marsh. Two of the eggs were broken by the carriage-wheel; the others measure 2.06 by 1.52 and 2.05 by 1.50. I do not think that any remain during winter.—(DRESSER, *Ibis*, 1866, 37.—*Totanus s.*, SENNETT, B. Rio Grande, 55.)

184. *Gambetta melanoleuca*, (Gmel.)

Abundant during the migrations, many passing the winter here.—(DRESSER, *Ibis*, 1866, 38.—SENNETT, B. Rio Grande, 55.)

185. *Gambetta flavipes*, (Gmel.)

Like the last, but perhaps less common in winter.—(DRESSER, *Ibis*, 1866, 38.)

186. *Numenius longirostris*, Wils.

Common during winter, many remaining to breed on the partially dry marshes near the coast. Found recently fledged young June 16.—(DRESSER, *Ibis*, 1866, 40.—SENNETT, B. Rio Grande, 55.)

187. *Numenius borealis*, (Forst.)

Common during the migrations, some passing the winter.—(DRESSER, *Ibis*, 1866, 40.—SENNETT, B. Rio Grande, 56.)

188. *Charadrius fulvus* *var. virginicus*, Bock.

Not rare in winter.—(*C. virginicus*, DRESSER, *Ibis*, 1866, 33.)

189. *Tringoides macularius*, (Linn.)

Rather rare in winter.—(DRESSER, *Ibis*, 1866, 38.)

190. *Tantalus loculator*, Linn.

On the 10th of April, 1876, I saw a pair of these birds on the edge of a shallow lagoon near Fort Brown.—(DRESSER, *Ibis*, 1866, 32.)

191. *Plegadis guarauna*, (Gm.)

Resident, but much more common in summer than in winter. On the 16th of May, 1877, Mr. G. B. Sennett and I visited a large patch of tulé-reeds growing in a shallow lagoon, about ten miles from the fort, in which large numbers of this Ibis and several kinds of Herons were breeding. The reeds covered an area of perhaps seventy-five acres or less, growing in water three or four feet in depth. Irregular channels of open water traversed the reeds here and there, but the bottom was comparatively firm, and there was little difficulty in wading in any direction. Besides the Ibises, the Great and Little White Egrets, Louisiana and Night Herons, and several other birds were breeding here. Often nests of all these species were placed within a few feet of each other, but there was a tendency towards the different kinds forming little nesting groups of ten or fifteen pairs. The reeds grew about six feet above the surface of the water, and were either beaten down to form a support for the nests, or dead and partly floating stalks of the previous year were used for that purpose.

It was impossible to estimate the number of the Ibises and different Herons nesting here. On approaching the spot, many would be seen about the edges of the lagoon or flying to or from more distant feeding grounds, but upon firing a gun a perfect mass of birds arose, with a noise like thunder, from the entire bed of reeds, soon to settle down again.

Both nests and eggs of the Ibises were quite unlike those of any of the Herons, and could be distinguished at a glance. The nests were made of broken bits of dead tulés, supported by and attached to broken and upright stalks of living ones. They were rather well and compactly built, and were usually well cupped, quite unlike the clumsy platforms of the Herons. The eggs were nearly always three in number, and at this date were far advanced in incubation; many nests contained young of all sizes. Fifty eggs now before me average 1.95 by 1.35, the extremes being 2.20 by 1.49 and 1.73 by 1.29; they are decidedly pointed at the smaller end, and are of a deep bluish green color.

On May 7 of the following year, I revisited this heronry, but there were no nests, and very few Ibises or Herons were to be seen. I am inclined to think that they moved to some other part of the extensive prairie, in several parts of which were beds of reeds similar to the one above described, but I was prevented by sickness from making any further investigations.

The young, when first hatched, are clothed in blackish down; the bill is whitish, with dusky base. When nearly fledged, the wings and back have a very marked metallic lustre; the base of bill, with terminal one-fourth inch and a two-fifths inch median band, black; the intervening portions pinkish-white.—(*Ibis ordi*, DRESSER, Ibis, 1866, 32.—*Falcinellus g.*, SENNETT, B. Rio Grande, 56.)

192. *Ibis alba*, (Linn.)

A few observed at all seasons, but I was unable to find any locality where they nested.—(DRESSER, *Ibis*, 1866, 32.—SENNETT, B. Rio Grande, 58.)

193. *Platalea ajaja*, Linn.

Not rare, but more common near the coast. It must breed in the vicinity.—(DRESSER, *Ibis*, 1866, 33.—SENNETT, B. Rio Grande, 58.)

194. *Ardea herodias*, Linn.

Common resident. Found nesting abundantly on Padre Island by Mr. Sennett.—(DRESSER, *Ibis*, 1866, 31.—SENNETT, B. Rio Grande, 58.)

195. *Herodias egretta*, (Gm.)

Common resident, but more plentiful in summer. Breeds abundantly in the same locality as the preceding species. The nests, as a rule, were distinguishable by their large size; the eggs and young were also quite characteristic. Twelve eggs average 2.14 by 1.54.—(DRESSER, *Ibis*, 1866, 31.—SENNETT, B. Rio Grande, 59.)

196. *Garzetta candidissima*, (Jacq.)

Abundant during the summer, a few passing the winter. Breeds in great numbers. Its nest and eggs are only to be confounded with those of the succeeding species.—(DRESSER, *Ibis*, 1866, 31.—SENNETT, B. Rio Grande, 59.)

197. *Hydranassa tricolor*, (Müll.)

Common summer visitant. I do not think that any are found here during winter. In visiting the heronry already referred to, the Louisiana Heron was found in abundance. The birds seemed more shy in leaving their nests than the two preceding. The nests and eggs closely resembled those of the Little White Egret, and could not be positively identified without seeing the parent; but, as a rule, the nests were smaller, and the eggs a little larger and of a deeper shade.—(SENNETT, B. Rio Grande, 60.—*Demiegretta ludoviciana*, DRESSER, *Ibis*, 1866, 31.)

198. *Dichromanassa rufa*, (Bodd.)

Not uncommon during the summer. In the latter part of March, 1878, Mr. Sennett found this species breeding in large numbers on Padre Island. The nests were placed on low prickly pears or on the ground.—(SENNETT, B. Rio Grande, 60.—*Demiegretta rufa*, DRESSER, *Ibis*, 1866, 31.—*Demiegretta pealii*, DRESSER, *Ibis*, 1866, 31.)

199. *Florida cærulea*, (Linn.)

Seen throughout the year, but most abundantly in summer. Breeds on Padre Island.—(DRESSER, *Ibis*, 1866, 31.—SENNETT, B. Rio Grande, 61.)

200. *Nyctiardea grisea* var. *nævia*, (Bodd.)

Rather common resident, but many go farther south in winter. Found breeding with the other species among the tulés, but in fewer

numbers. The nests differed from those of the others by twigs and small branches being generally used in their construction, which must have been brought from a considerable distance. They were but slightly above the surface of the water, and most of the nests contained nearly fledged young.—*N. gardeni*, DRESSER, Ibis, 1866, 32.—*N. nevra*, SENNETT, B. Rio Grande, 61.)

201. *Nyctherodius violaceus*, (Linn.)

Rather uncommon. Probably breeds at no great distance, but I found no nests.—(DRESSER, Ibis, 1866, 32.—SENNETT, B. Rio Grande, 61.)

202. * *Butorides virescens*, (Linn.)

Common in summer, but rare in winter. Several pairs breed within Fort Brown, placing their nests on horizontal branches of mesquite-trees. Several sets average 1.49 by 1.15.—(DRESSER, Ibis, 1866, 32.)

203. *Botaurus lentiginosus*, (Montag.)

Occurs in moderate numbers during the migrations.—(DRESSER, Ibis, 1866, 32.)

204. *Ardetta exilis*, (Gmel.)

A few pairs were seen in the heronry already referred to. No nests were found, but the birds unquestionably breed there.—(DRESSER, Ibis, 1866, 32.—SENNETT, B. Rio Grande, 61.)

205. *Grus americana*, (Linn.)

Not rare, especially on the prairies near the coast. I do not think that either species of Crane breeds in this neighborhood.—(DRESSER, Ibis, 1866, 30.—SENNETT, B. Rio Grande, 61.)

206. *Grus canadensis*, (Linn.)

Decidedly more abundant than the White Crane during the winter months, and not so shy.—(DRESSER, Ibis, 1866, 30.)

207. *Porzana carolina*, (Linn.)

Common during the migrations. I am quite positive that a few pairs breed near here in suitable localities.—(DRESSER, Ibis, 1866, 40.)

208. *Gallinula galeata*, (Licht.)

Parents and eggs obtained on the 16th of May among beds of reeds.—(SENNETT, B. Rio Grande, 61.)

209. *Ionornis martinica*, (Linn.)

Doubtless breeds, for I have taken young birds in September that were scarcely able to fly.—(DRESSER, Ibis, 1866, 41.)

210. *Fulica americana*, Gm.

Very common resident. Breeds among patches of tulés, making a rather bulky platform of bits of dead reeds scarcely raised above the surface of the water. Fourteen is the greatest number of eggs I have found in one nest.—(DRESSER, Ibis, 1866, 40.—SENNETT, B. Rio Grande, 62.)

Family PARRIDÆ: The JACANAS.

Parridæ, "SELYS, 1842".—GRAY, Hand-list, III, 1871, 69.—SCL. & SALV., Nom. Neotr. 1873, viii, 142.—BOUCARD, Cat. Av. 1876, IX, 11.

< *Rallidæ*, VIGORS (*vide* GRAY).—LILLJEBORG, P. Z. S. 1866, 17.

= *Parrinæ*, GRAY, List Genera B. 1840, —; 2d ed. 1841, 91 (< *Palamedeidæ*).—GRAY & MITCH., Genera B. 4to, III, 1849, 58 (< *Palamedeidæ*); Genera and Subg. 1855, 119 (< *Palamedeidæ*).—LILLJEBORG, P. Z. S. 1866, 17 (< *Rallidæ*).

< *Palamedeidæ*, GRAY, l. c.

< *Gallinulidæ*, BLAS. (*vide* GRAY).

CH.—Small-sized wading birds, combining the general appearance of Rails and Plovers, but differing from either in the remarkable and excessive elongation of the toes and claws, the latter nearly straight and much compressed, that of the hallux much longer than its digit and slightly recurved.

The above brief diagnosis is sufficient to distinguish the Jacanas from all other wading birds. Their nearest allies appear to be the Plovers, from which they differ chiefly in the character of the feet, as pointed out above. The single American genus *Parra*, Lath., is further characterized by the presence of leaf-like lobes at the base of the bill, and a sharp, conical spur projecting from the inside of the bend of the wing, in the possession of which features they present a striking analogy to certain Plovers, as the genera *Lobivanellus*, Strickl., and *Hoplopterus*, Bonap. The genus *Parra*, of which there are several species, all American,* is characterized as follows:—

Genus PARRA, Linnæus.

< *Jacana*, BRISS., Orn. V, 1760, 121. Type, *Parra jacana*, AUCT. (Includes *Hydralector*, Wals., and *Metopodius*, Wagl.)

< *Gallinula*, RAY (*vide* GRAY).

< *Parra*, LINN., S. N. I, 1766, 259. Type, *P. dominica*, Linn., = *Lobivanellus brissoni*, (Wagl.)! (Includes also *Chauna* and *Jacana*.)—LATHAM, Ind. Orn. II, 1790, 762. Type, *P. jacana*, Linn. (Includes *Hydrophasianus*, Wagl., *Chauna*, Illiger, and *Metopodius*, Wagl.)—GRAY, Hand-list, III, 1871, 69 (subg. *Parra*).

= *Parra*, GRAY, List Genera, 2d ed. 1841, 91; Gen. and Subg. 1855, 119, No. 1976.—GRAY & MITCH., Genera B. III, 1849, 288.—SCL., P. Z. S. 1856, 282 (synopsis of species).—SCL. & SALV., Nom. Neotr. 1873, 142 (list of species).—BOUCARD, Cat. Av. 1876, 11 (list of species).

CH.—Remiges normal. Rectrices much abbreviated, very soft, entirely concealed by the tail-coverts. Forehead with large, leaf-like lobe, free laterally and posteriorly, adhering centrally and anteriorly; rictus ornamented by a smaller lobe (rudimentary in *P. gymnotoma*).

The above characters are chiefly those which distinguish the American genus *Parra* from its Old World allies *Hydrophasianus*,† *Metopo-*

* For a synopsis of the species of this genus, see Schater "On the American Genus *Parra*", in Proc. Zool. Soc. Lond. 1856, p. 282.

† "*Hydrophasianus*, Wagler, 1832." Type, *H. chirurgus* (Scop. i).

dus,* and *Hydralector*.† I am unable to state in just what essential particulars the two latter differ from *Parra*, never having seen specimens of any species of either form. The first, however, differs very widely in the great development of the rectrices, of which the intermediæ are excessively elongated; in the curious attenuation of the primaries, which are, moreover, of very unequal length, and in the entire absence of lobes about the base of the bill. These characters I have drawn from figures of the single species, *H. chirurgus* (Scopoli), not having seen the bird itself.

In addition to the generic characters given above, the following also may be mentioned:—

Bill somewhat Plover-like in form, the basal half with the upper and lower outlines nearly parallel and decidedly approximated, the terminal half of the culmen strongly convex, the gonys nearly straight, and decidedly ascending terminally; nostrils small, horizontal, elliptical, situated about half-way between the anterior angle of the eye and the tip of the bill. Primaries 10, reaching to the tips of the tertials, the three outer quills longest and nearly equal, their inner webs slightly narrowed near the end. Tarsus and bare portion of the tibia covered by a continuous frontal and posterior series of transverse scutellæ, these sometimes fused into continuous sheaths; middle toe (exclusive of its claw) about equal to the tarsus (sometimes a little shorter); outer toe equal to the middle toe, but its claw a little shorter; inner toe a little shorter than the outer, but its claw considerably longer; hallux about equal to the basal phalanx of the middle toe, but its claw reaching nearly, if not quite, to the end of the middle toe.

211. *Parra gymnostoma*.

Parra gymnostoma, WAGLER, Isis, 1831, 517.—SCL., P. Z. S. 1856, 283 (S. Mexico to New Granada. Diagnosis and synonymy); 1857, 206 (Jalapa).—SCL. & SALV., Ibis, 1859, 231 (Belize, Honduras; Peten, Guatemala); Nom. Neotr. 1873, 142.—TAYLOR, Ibis, 1860, 315 (Honduras).—SALVIN, Ibis, 1870, 116 (Costa Rica); P. Z. S. 1870, 218 (Costa Rica).—LAWR., Mem. Boston Soc. II, 1874, 312 (Mazatlan, Manzanillo Bay, Zacatula R., and Rio de Coahuayana, W. Mexico. Habits. Descr. nest and eggs); Bull. U. S. Nat. Mus. No. 4, 1876, 50 (Isth. Tehuantepec).—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Ft. Brown, Texas; 1 pair; August).

Parra cordifera, LESS., Rev. Zool. 1842, 135 (Acapulco. Descr. adult).—DES MURS, Icon. Orn. 1845, pl. 42.

SP. CH.—*Adult*: Wing, 4.50–5.40; culmen, 1.15–1.40; tarsus, 1.90–2.35; middle toe, 1.85–2.25.‡ Head, neck, jugulum, and extreme anterior portion of the back uniform black, with a faint silky glossy-green gloss below. Rest of the plumage mainly uniform rich purplish chestnut, with a faint purple gloss, brightest or most rufescent on the wings,

* "*Metopodius*, Wagler, 1832." Type, *Parra africana*, Lath., *vide* Gray.

† "*Hydralector*, Wagler, 1832." Type, *Parra cristata*, Vieill., *vide* Gray.

‡ Extremes of thirteen examples.

more purplish on the back, rump, and upper tail-coverts, and of a rich dark purplish maroon shade on the breast and sides; anal region, tibiæ, and crissum duller and more grayish. Remiges (except the tertials) pale yellowish pea-green, bordered terminally with dull dusky, this border very narrow, and strictly terminal on the secondaries, but broader and involving more or less of both edges of the quills on the primaries, where it increases in extent to the outer quill, which has the entire outer web blackish; alulæ and primary coverts dull blackish. Tail-feathers uniform rich chestnut. "Iris dark brown; bill, alar spurs, and frontal leaf, bright yellow; upper base of bill bluish white, the space between it and the nasal leaf bright carmine; feet greenish" (Sumichrast, MS., *vide* Lawr., Bull. U. S. Nat. Mus. No. 4, 1876, p. 50).

Young: Frontal leaf rudimentary. Pileum grayish brown, bordered on each side by a wide and conspicuous superciliary stripe of buffy white, extending to the occiput; below this stripe, another narrower one of black or dusky, beginning at the posterior angle of the eye and extending along the upper edge of the auriculars to the nape, which is also of this color; remainder of the head, with the entire lower parts, except the sides, continuous buffy white, more strongly tinged with buff across the jugulum. Upper parts in general (except the remiges) light grayish-brown, the feathers bordered terminally with rusty buff in the younger stage, but uniform in older individuals; rump more or less tinged with chestnut. Sides and lining of the wing dusky black, but in older examples more or less tinged with chestnut. Remiges as in the adult; rectrices grayish-brown.

The downy young is unknown, or at least if described I have been unable to find out where.

In the considerable series of specimens of this species contained in the collection of the National Museum, notable variations in size and proportions occur among specimens of the same age and sex, but apparently without regard to locality. Cuban specimens do not differ in the least from Mexican and Central American examples.

The following note was published in the Bulletin of the Nuttall Ornithological Club, vol. i, p. 38. I have nothing to add to it, except that during a recent visit to Washington Mr. Ridgway showed me some skins of this curious bird, and I was enabled to positively identify them with the birds I saw:—"Early in August (1876) I saw a pair of water-birds quite new to me on the borders of a lagoon near Fort Brown. I was on horseback at the time, and did not have my gun, but had a good opportunity to observe them carefully. The next day I winged one of them, but it fell into a dense bed of water-plants, and could not be found, and the survivor disappeared. Respecting a letter describing the bird as seen, Mr. Ridgway writes: 'The bird you describe is undoubtedly *Parra gymnostoma*; * * * the chestnut back and yellow (greenish-yellow) wings settle the species beyond a doubt.'"

212. *Cygnus americanus*, Sharpless.

Early in January, 1878, a fine specimen was brought into Brownsville alive by a Mexican, who said that it was caught on a lagoon by one of his dogs. It must have been wounded, though I could see no sign of this. Either this species or the Trumpeter Swan is said to be not uncommon near the coast during winter.

213. *Anser albifrons* var. *gambeli*, Hartl.

The first of the Geese to return in the autumn, usually about the first week in October. Comparatively few of this or the other species of Geese remain throughout the winter, but during the migrations this one is only surpassed in numbers by the Snow Goose. I have seen a flock of at least two hundred pass over Fort Brown as late as the 18th of April.—(*A. gambeli*, DRESSER, Ibis, 1866, 42.)

214. *Chen hyperboreus*, (Pall.)

Very abundant, especially on the salt prairies near the coast.—(DRESSER, Ibis, 1866, 41.—SENNETT, B. Rio Grande, 62.)

215. *Branta canadensis*, (Linn.)

Not rare, but the least common of the Geese in this vicinity.—(*Bernicla c*, DRESSER, Ibis, 1866, 42.)

216. *Branta hutchinsi*, (Sw. & Rich.)

More abundant than *B. canadensis*, but less so than *A. gambeli*.—(*Bernicla h.*, DRESSER, Ibis, 1866, 42.)

217. *Dendrocygna autumnalis*, (Linn.)

This large and handsome bird arrives from the south in April, and is soon found in abundance on the river banks and lagoons. Migrating at night, it continually utters a very peculiar chattering whistle, which at once indicates its presence. Called by the Mexicans *pato maizal*, or Corn-field Duck, from its habit of frequenting those localities. It is by no means shy, and large numbers are offered for sale in the Brownsville market. Easily domesticated, it becomes very tame, roosting at night in trees with chickens and turkeys. When the females begin to lay, the males leave them, and gather in large flocks on sand-bars in the river. My knowledge of the breeding habits is derived from Dr. S. M. Finley, U. S. A., who had ample opportunity of observing these birds at Hidalgo. The eggs are deposited in hollow trees and branches, often at a considerable distance from water (two miles), and from eight to thirty feet or more from the ground. The eggs are placed on the bare wood, and are from twelve to sixteen in number. Two broods are raised, and the parent carries the young to water in her bill. Twelve eggs received from Dr. Finley average 2.11 by 1.53, with but little variation in size: they are of the usual duck shape, and in color are a rather clear yellowish-white. The birds leave in September, but a few late broods are seen as late as November. The soft parts in a full-plumaged living male were

as follows: iris brown; bill coral-red, orange above; nail of bill bluish; legs and feet pinkish-white.—(DRESSER, Ibis, 1862, 42.—SENNETT, B. Rio Grande, 62.)

218. *Dendrocygna fulva*, (Gmel.)

I cannot say much in regard to this species, though it is about as common as the preceding in this vicinity. Like the Corn-field Duck, it is a summer visitant, and both species frequent the same places. The notes while flying are somewhat different. I know nothing definite in regard to the breeding habits, but they probably do not differ much from those of the other bird. Dr. Finley tells me that he did not meet with it at Hidalgo. In a fresh specimen, the bill was bluish-black; legs light slaty-blue.—(DRESSER, Ibis, 1866, 42.)

219. *Anas boschas*, Linn.

Not uncommon during the winter months.—(DRESSER, Ibis, 1866, 42.)

220. *Anas obscura*, Gm.

Not common; a few remain to breed on the marshes near the coast.—(DRESSER, Ibis, 1866, 42.—SENNETT, B. Rio Grande, 63.)

221. *Dafila acuta*, (Linn.)

Rather plentiful.—(DRESSER, Ibis, 1866, 43.—SENNETT, B. Rio Grande, 63.)

222. *Chaulelasmus streperus*, (Linn.)

Probably the most common Duck in this vicinity during the winter. My game register shows that a greater number of Gadwalls were killed each winter than of any other Duck. Some remain throughout the summer.—(DRESSER, Ibis, 1866, 43.—SENNETT, B. Rio Grande, 63.)

223. *Mareca americana*, (Gm.)

Rather common, especially in spring and autumn.—(DRESSER, Ibis, 1866, 43.—SENNETT, B. Rio Grande, 63.)

224. *Nettion carolinensis*, (Gm.)

Common, especially during the migrations.—(DRESSER, Ibis, 1866, 43.)

225. *Querquedula discors*, (Linn.)

Common, arriving early in September. A few remain during the winter, but the great majority go farther south, returning about the middle of March.—(DRESSER, Ibis, 1866, 43.)

226. *Querquedula cyanoptera*, (Vieill.)

Not rare during the migrations; more are seen in spring than in autumn.

227. *Spatula clypeata*, (Linn.)

Very common in winter. I have seen several pairs on the marshes during the breeding season.—(SENNETT, B. Rio Grande, 63.)

228. *Fulix marila*, (Linn.)

Rather rare.—(DRESSER, Ibis, 1866, 43.)

229. *Fulix affinis*, (Eytou.)

Decidedly more common than the last.—(DRESSER, Ibis, 1866, 43.—*Fuligula a.*, SENNETT, B. Rio Grande, 63.)

230. *Fulix collaris*, (Donov.)

A few specimens killed.—(DRESSER, Ibis, 1866, 43.)

231. *Aythya americana*, (Eyt.)

Not uncommon.—(*Aythya a.*, DRESSER, Ibis, 1866, 43.)

232. *Aythya vallisneria*, (Wils.)

Rarer than the last species; but few specimens shot.—(*Aythya v.*, DRESSER, Ibis, 1866, 43.)

233. *Bucephala albeola*, (Linn.)

Rather plentiful.—(DRESSER, Ibis, 1866, 43.)

234. *Erismatura rubida*, (Wils.)

Abundant.

235. *Lophodytes cucullatus*, (Linn.)

A few seen during winter.—(DRESSER, Ibis, 1866, 44.)

236. *Pelecanus erythrorhynchus*, (Gmel.)

Rather common, and seen at all seasons. I was unable to find any breeding places of this species, but they unquestionably nest near the coast, and also at no great distance from Hidalgo.—(DRESSER, Ibis, 1866, 45.—*P. trachyrhynchus*, SENNETT, B. Rio Grande, 63.)

237. *Pelecanus fuscus*, Linn.

Common resident. Found breeding abundantly on Padre and neighboring islands by Mr. Sennett in March, 1878.—(DRESSER, Ibis, 1866, 45.—SENNETT, B. Rio Grande, 64.)

238. *Plotus anHINGA*, Linn.

Occasionally observed about Fort Brown, but appears to be more abundant in the lagoons higher up the river.—(DRESSER, Ibis, 1866, 45.)

239. *Graculus mexicanus*, (Brandt.)

Common resident. I did not find any nests, but think they are placed in the dense growth of trees and thorny bushes that borders most of the lagoons about here.—(DRESSER, Ibis, 1866, 45.—SENNETT, B. Rio Grande, 64.)

240. *Larus argentatus*, Gm.

Not rare along the coast in winter. One shot near Fort Brown on the 3d of March, 1877.—(SENNETT, B. Rio Grande, 64.)

241. *Larus delawarensis*, Ord.

Common in winter.—(SENNETT, B. Rio Grande, 64.)

242. *Chrococephalus atricilla*, (Linn.)

Common resident, breeding near the coast, and also on the salt prairies near the fort.—(DRESSER, Ibis, 1866, 44.—*Larus a.*, SENNETT, B. Rio Grande, 64.)

243. *Sterna anglica*, Mont.

Rather abundant. Found breeding in company with Forster's Tern.—(SENNETT, B. Rio Grande, 64.—*S. aranea*, DRESSER, Ibis, 1866, 44.)

244. *Sterna caspia* var. *imperator*, Coues.

Breeds on Padre Island.—(SENNETT, B. Rio Grande, 65.)

245. *Sterna maxima*, Bodd.

Breeds on Padre Island.—(*S. regia*, DRESSER, Ibis, 1866, 44.)

246. *Sterna cantiaica*, Gm.

Breeds on Padre Island.—(SENNETT, B. Rio Grande, 65.)

247. *Sterna forsteri*, Nutt.

On May 16, 1877, Mr. Sennett and I found a colony of these Terns nesting on a nearly submerged grassy island, among lagoons and marshes. They had but just begun to lay. About two dozen eggs were obtained, and a few parents shot for identification. The nests were slight depressions among the short grass, and the eggs were frequently wet.—(SENNETT, B. Rio Grande, 65.)

248. *Sterna antillarum*, (Less.)

Common in summer, and some pass the winter. Deposit their eggs on sand-bars in the river.—(*S. frenata*, DRESSER, Ibis, 1866, 44.—*S. supereiliaris antillarum*, SENNETT, B. Rio Grande, 66.)

249. *Hydrochelidon nigra*, (Linn.)

Rather plentiful during summer.—(*H. plumbea*, DRESSER, Ibis, 1866, 45.)

250. *Rhynchops nigra*, Linn.

Not rare in summer.—(DRESSER, Ibis, 1866, 45.—SENNETT, B. Rio Grande, 66.)

251. *Podiceps dominicus*, (Linn.)

A rather common resident. Several nests, undoubtedly of this Grebe, were found on May 16, 1877, while visiting the heronry already referred to. They were made of water-plants and pieces of reeds slightly fastened to one or two tulé-stalks, and forming a wet, floating mass. No eggs were obtained.—(SENNETT, B. Rio Grande, 66.)

NOTE.—So far as it appears, Dr. Merrill's claim (Bull. N. O. C. I, 88), to have been the first to have really added this species to the North

American fauna, must be admitted to be well founded. It was certainly "new to the American fauna", unless it had been previously ascertained to be entitled to be so ranked. Unless Dr. Gambel's attributing this bird to California be admitted, which it cannot be without confirmation, no one can properly make any such claim. The Berlandier eggs—there were no birds—are unidentified, though probably genuine, but of Mexican origin. It is also included in Dr. Cones's Birds of the Northwest, where, however, it is only given as occurring "north to the Rio Grande"—not "north of the Rio Grande". As Dr. Cones gives no authority for regarding it as known to be North American, but stops at the boundary line, the inference is that its presence was conjectural and not positive.—T. M. B.

252. *Podilymbus podiceps*, (Linn.)

Occurs in winter.—(DRESSER, Ibis, 1866. 46.)

AUGUST 1, 1878.

ON A NEW SERRANOID FISH, *EPINEPHELUS DRUMMOND-HAYI*, FROM THE BERMUDAS AND FLORIDA.

By G. BROWN GOODE and TARLETON H. BEAN.

The National Museum possesses two specimens of a Serranoid fish, apparently undescribed, for which we propose the name *Epinephelus Drummond-Hayi*, dedicating the species to Colonel H. M. Drummond Hay, C. M. Z. S., of Leggieden, Perth, Scotland, formerly of the British Army, by whom the species was first discovered at the Bermudas in 1851.

The species is easily recognized by its numerous, small, star-like, white spots on a dark ground, a type of coloration not found in any other representative of this family hitherto described.

A collection of water-color drawings, lent to the Smithsonian Institution by Colonel Drummond Hay, contains an excellent sketch of one of these fishes, which was taken by him on the outer reef of the Bermudas in 1851. This specimen weighed $52\frac{1}{2}$ pounds. The drawing is on the scale of one-fifth.

The smaller specimen (No. 16,795) is fifteen and three-quarters inches long. It was received in May, 1876, from Mr. E. G. Blackford, and was for some days on exhibition in the large glass refrigerator in the Government Building on the Exhibition Grounds in Philadelphia. It was said to have been brought from Southern Florida by one of the New York market fleet. A cast of this fish was made, as well as an accurate sketch in water-colors.

A second specimen (No. 21,255) was received early in May, 1878, from Mr. Silas Stearns of Pensacola, Fla. Its length is sixteen and three-quarters inches. The following description has been prepared from these two specimens. We have seen other specimens of this species in the

New York Aquarium, which were said to have been brought from the Bermudas. The fish belongs to the genus *Serranus* as defined by Günther, and to the genus *Epinephelus* as limited by Gill, having, in distinction from the allied genus *Trisotopsis*, nine rays in the anal as well as other characters.

There is a remarkable uniformity in the measurements of the two specimens as given in tabular form below. That from Pensacola has longer fins, and the snout also a trifle longer. This is perhaps due to some slight distortion of the specimens, owing to the greater length of time which the first had been in alcohol.

Epinephelus Drummond-Hayi, *sp. nov.*, Goode & Bean.

Diagnosis.—Length of head about one-third of total length (including caudal), and three-eighths of length without caudal. Greatest height of body equal to length of head. Least height of tail equal to half the length of external caudal rays, and approximately to that of snout. Præoperculum finely and evenly serrated; denticulations somewhat coarser at the angle. Suboperculum and interoperculum denticulated for a short distance on each side of their common junction. Maxillary bone nearly and mandibular quite reaching to a line drawn vertically through the centre of the orbit.

Eye circular, its diameter contained six and one-third times in the length of the head, and slightly less than the width of the interorbital area, which is half the distance from the snout to the centre of the orbit.

Distance of dorsal from snout equal to the greatest height of the body, and twice the length of the mesial caudal rays or of ventral fin. The length of the first spine is less than half that of the second, and more than one-third that of the fourth, and longest. The length of the first ray is equal to or greater than that of the longest spine; that of the last ray, to the diameter of the eye.

The distance of anal from snout equal to twice the height of the body at the ventrals; the length of its first spine about equal to that of the first of the dorsal; the length of the third spine equal to that of the snout. The length of the first ray is about equal to that of the maxillary; that of longest ray nearly half the length of head; that of the last ray nearly equal to that of the second anal spine.

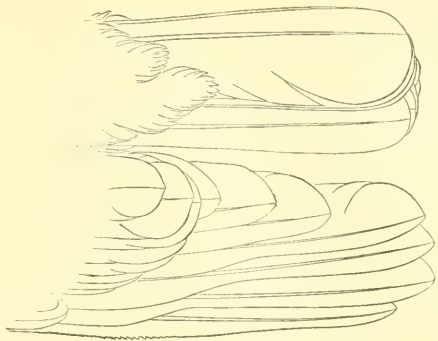
Caudal truncate when expanded; slightly emarginate when in natural position; covered with small scales nearly to its tip.

Length of median rays half that of the head, that of external rays equal to two-thirds the distance from snout to pectoral, and also to the length of that fin.

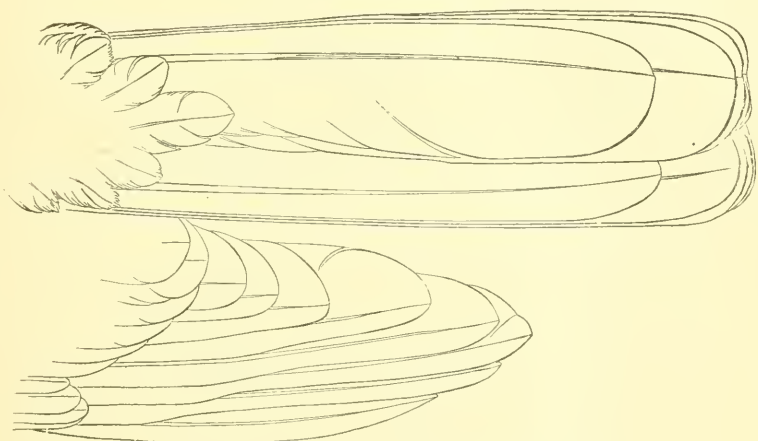
The distance of ventral from snout about twice its own length.

Radial Formula.—D. XI, 16; A. III, 9; C. + 14 +; P. I, 16; V. I, 5. Scales in lateral line, 125; above lateral line, 32; below, 56–57.

Color, light umber-brown, everywhere densely spotted with irregular,



Caprimulgus nuttalli, ♂. Utah. (3.)



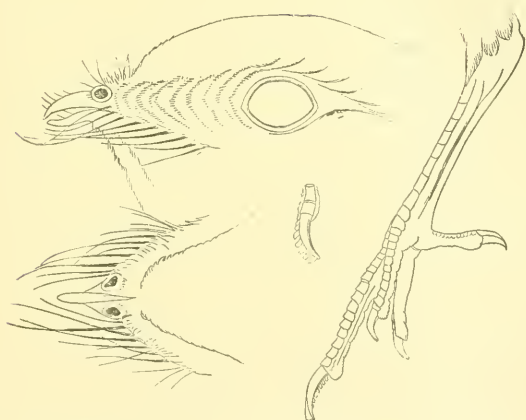
Nyctidromus albicollis, ♂. 57747. Tehautepec. (3.)



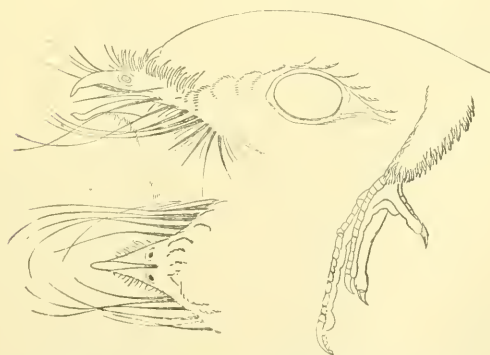
Caprimulgus vociferus, ♂. Maryland. (3.)



Caprimulgus nuttalli, ♂. Utah. (Nat. size.)

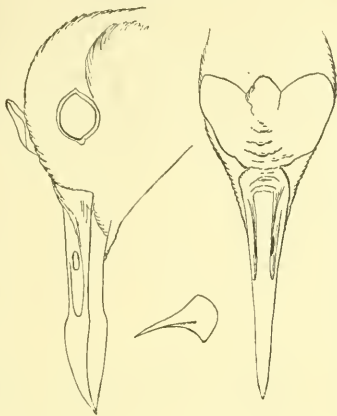


Nyctidromus albicollis, ♂. 57747. Tehuantepec. (Nat. size.)

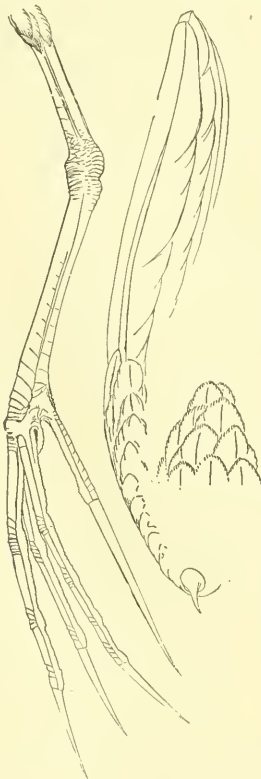


Caprimulgus vociferus, ♂. Maryland. (Nat. size.)





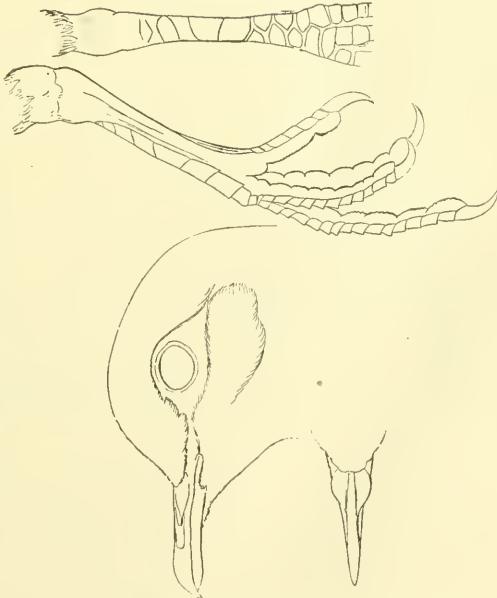
Parra gynanostoma, ♂ ad. 1831. Vera Cruz, Mexico. (Nat. size.)



Parra gynanostoma, ♂ ad. 1831. Vera Cruz, Mexico. (♂.)



Echinoptila albifrons, ♂. 58293. Tres Marias. (♂.)



Echinoptila albifrons, ♂. 58293. Tres Marias. (Nat. size.)

somewhat stellate, white spots, except upon the lips and under margin of the body. There are about forty of these patches between the gill-opening and the base of the caudal. A slight tendency to coalesce may be observed in the spots upon the sides.

At Pensacola, this fish is called the Hind; at the Bermudas, it is the "John Paw".

Table of Measurements.

Current number of specimen	16,795.		21,255.	
Locality	Bermuda.		S. Stearns. Pensacola, Fla.	
	Millim.	100ths.	Millim.	100ths.
Extreme length (to base of caudal)	335	.....	360	.....
Length to end of middle caudal rays	399	.....	426	.....
Body:				
Greatest height (behind ventrals)		38		38
Height at ventrals		35		36
Least height of tail		11		11
Head:				
Greatest length		38		38
Width of interorbital area		7		7
Length of snout		10½		11
Length of operculum (to end of flap)		12		12
Length of maxillary		17		17
Length of mandible		21		20½
Distance from snout to centre of orbit		14		14
Diameter of eye		6		6
Dorsal (spinous):				
Distance from snout		38		39
Length of base		27		29
Length of first spine		4		4½
Length of second spine		10		11
Dorsal (soft):				
Length of base		21		24
Length of first ray		13		13
Length of longest ray		(6th) 14		(4th) 15
Length of last ray		6		6
Anal:				
Distance from snout		70		70
Length of base		16		16
Length of first spine		4½		4½
Length of second spine		8½		9
Length of third spine		10½		10
Length of first ray		16		17
Length of longest ray		(3d) 18		(4th) 18½
Length of last ray		8		8
Caudal:				
Length of middle rays		19		19
Length of external rays		22		22
Pectoral:				
Distance from snout		33		34
Length		21		22
Ventral:				
Distance from snout		38		40
Length		19		19
Branchiostegals	7	.....	7	.....
Dorsal	XI, 16	.....	XI, 16	.....
Anal	III, 9	.....	III, 9	.....
Caudal	+ 14 +	.....	+ 14 +	.....
Pectoral	1-16	.....	1-16	.....
Ventral	1-5	.....	1-5	.....
Number of scales in lateral line	125	.....	125	.....
Number of transverse rows above lateral line	(32)	.....	32	.....
Number of transverse rows below lateral line	(56)	.....	57	.....

WASHINGTON, May 25, 1878.

DESCRIPTIONS OF TWO NEW SPECIES OF FISHES, LUTJANUS BLACKFORDII AND LUTJANUS STEARNSII, FROM THE COAST OF FLORIDA.**By G. BROWN GOODE and TARLETON H. BEAN.**

Recent explorations on the coast of Florida have brought to light several undescribed species of large fishes. Some of them have already been named by us. Two species of *Pristipomatoid* fishes are characterized below.

Lutjanus Blackfordii, *sp. nov.*, Goode & Bean.

The well-known Red Snapper of our Southern coast has, strangely enough, never been scientifically described. This is due to an erroneous identification of this species with a common West Indian form, *Lutjanus aya*, from which it differs in several particulars, notably in the size of the eye and of the scales.

The species is dedicated to Mr. Eugene G. Blackford of New York City, to whom the National Museum is indebted for many hundreds of specimens of rare fishes, and by whose vigilant study of the New York fish-markets several species have been added to the fauna of the United States.

We base our description upon a fresh specimen (No. 21,330), sent from Pensacola, Fla., May —, 1878, by Mr. Silas Stearns, which is twenty-six inches long, and weighs $11\frac{1}{2}$ pounds; also two well executed casts, one, No. 12,515, obtained by Mr. Milner, in Washington City market, 1874, thirty inches long, and one, No. 20,978, thirty-three inches long, obtained from the Savannah Bank, March, 1878, by Mr. Goode.

Diagnosis.—Body much compressed; its upper profile ascending from the snout, with a slight concavity in front of eye to the origin of the spinous dorsal, thence descending in a long curve to the base of the caudal; under profile much less arched. Upper and lower jaw of even extent. The greatest height of the body equal to length of head. Least height of tail equal to one-third of the distance from the snout to the pectoral. Greatest height of head slightly less than one-third of total length, including caudal and three-eighths of length without caudal. Præoperculum finely and evenly serrated, except at the angle, where the denticulations are coarser: a slight emargination above the angle, in which is received an elevation upon the interopercular bone, and two shallower emarginations above. The maxillary falls short of the vertical line from the anterior margin of the orbit, the mandibular bone of that from the middle of the orbit. Eye circular; its diameter contained seven and one-third times in the total length of the head. Length of snout nearly equal to that of maxillary. Length of mandible equal to half the height of the body at ventrals, and equal to or slightly less than distance from snout to centre of orbit. Distance of dorsal from snout about three times the length of snout; its length of base nearly equal to that of the pectoral. The length of its longest spine is equal

to twice the second anal spine, and about three times that of the first dorsal spine. The first dorsal ray is twice as long as the first dorsal spine, its longest ray nearly equal to the first ray of the anal.

Distance of anal fin from snout equal to two-thirds of total length (caudal excluded), twice as far from snout as is the pectoral; the length of its base slightly more than that of mandible; its first spine half as long as its second spine; its third spine slenderer, and slightly longer than the second; its first ray is about twice as long as its second spine; its longest ray equal to middle caudal ray, or, in young specimens, much longer; its last ray half the length of the first.

Caudal much emarginate, crescent-shaped; the median rays two-thirds as long as the external rays.

Pectoral midway between snout and anal; its length twice that of the maxillary. Distance of ventral from snout equal to the height of the body; its length three times that of second anal spine.

Radial Formula.—B. VII; D. X, 14; A. III, 9; C. + 17 +; P. I, 16; V. I, 5.

Scales.—8, 50, 15. Scales extending half the length of the anal rays on the membrane; on the external caudal rays nearly to tip, and with slight traces upon the spinous dorsal in front of the spines; and in the soft dorsal somewhat more extended.

Color.—Uniform scarlet. Centre of scales lighter, also belly, which is silvered; inside of axil of pectoral darker maroon.

This species is closely allied to the *Lutjanus torridus* of Cope, but differs in several particulars, notably (1) the smaller eye; (2) the greater number of dorsal and anal rays; (3) the smaller and more numerous scales; (4) the less emargination of the tail; (5) the shorter ventral fin (according to figure of Cope); (6) the higher occipital crest; and (7) in coloration.

Professor Cope's type measured 14 inches; ours range from 33 to 17½.

Lingual teeth in two patches; the anterior cordate, with emargination posteriorly; the other ovate-lanceolate, broadest anteriorly. Vomerine patch a quadilateral figure, with concave sides, and with the longest sides posteriorly. Palatine patches somewhat spatulate, broadest posteriorly.

Table of Measurements.

Current number of specimen	21,330.	
Locality	Pensacola, Fla.	
	Millim.	100ths.
Extreme length.....	560	.....
Length to end of middle caudal rays.....	654	.....
Body:		
Greatest height.....		37½
Height at ventrals.....		36½
Least height of tail.....		11
Head:		
Greatest length.....		37½
Width of interorbital area.....		8½
Length of snout.....		14
Length of maxillary.....		14½
Length of mandible.....		18
Distance from snout to centre of orbit.....		17½
Diameter of eye.....		5½
Dorsal (spinous):		
Distance from snout.....		43
Length of base.....		29
Length of first spine.....		4½
Length of second spine.....		10
Length of longest spine.....		13
Height at last spine.....		7½
Dorsal (soft):		
Length of base.....		22½
Length of first ray.....		8
Length of longest ray.....	(6th)	11½
Height at last ray.....		7½
Anal:		
Distance from snout.....		68½
Length of base.....		15½
Length of first spine.....		3
Length of second spine.....		6½
Length of third spine.....		7½
Length of first ray.....		12
Length of longest ray.....	(3d)	16½
Length of last ray.....		6
Caudal:		
Length of middle rays.....		16
Length of external rays.....		24
Pectoral:		
Distance from snout.....		33
Length.....		30
Ventral:		
Distance from snout.....		37
Length.....		19½
Braichistegals.....		7
Dorsal.....	X,	14
Anal.....	III,	9
Caudal.....	+ 17 +	
Pectoral.....	I,	16
Ventral.....	I,	5
Number of scales in lateral line.....		50
Number of transverse rows above lateral line.....		8
Number of transverse rows below lateral line.....		15
Weight.....pounds..		11½

Table of Measurements—Continued.

Current number of specimen	A.		B.		C.		D.	
	Gulf of Mexico.		Gulf of Mexico.		Gulf of Mexico.		Gulf of Mexico.	
Locality	{		{		{		{	
	Millim.	100ths	Millim.	100ths	Millim.	100ths	Millim.	100ths
Extreme length	650		520		460		380	
Length to end of middle caudal rays	752	(29½ in)	613	(24 in)	540	(21½ in)	445	(17½ in)
Body:								
Greatest height (behind ventrals)		36		37½		36½		37½
Height at ventrals		35½		36		35½		36½
Least height of tail		11		11		11		11
Head:								
Greatest length (to end of opercular flap)		38		38		38		37½
Width of interorbital area		9		8		8		8
Length of snout		14½		14		14		14
Length of upper jaw		15		15		14½		15½
Length of mandible		18		18		17½		18½
Distance from snout to centre of orbit		17½		18		17½		18
Diameter of eye		5		5½		5½		6
Dorsal (spinous):								
Distance from snout		41		43		41½		42½
Length of base		26½		27½		27		28
Length of first spine		3½		4		3		4½
Length of second spine		9		9		9½		10
Length of longest spine		11½		12½		12½		13½
Length of last spine		6½		8		8		9
Dorsal (soft):								
Length of base		22		22		22½		20½
Length of first ray		7		9½		9½		9½
Length of longest ray		10		13		12		12
Length of last ray		6		6		6½		6
Anal:								
Distance from snout		68		69		70		72½
Length of base		15½		15		15		15
Length of first spine		3		3½		3½		5
Length of second spine				7		7½		9½
Length of third spine		7		8½		8½		9½
Length of first ray		11		12½		12		12
Length of longest ray		14		14½		18		16½
Length of last ray		6½		6½		7		7
Caudal:								
Length of middle rays		15½		18		17		17
Length of external rays		21		26		26		26
Pectoral:								
Distance from snout		35		35½		34		35½
Length		27		33		32		32
Ventral:								
Distance from snout		38½		38		38		39½
Length		17		20½		20		21
Branchiostegals		7		7		7		7
Dorsal	X, 14		X, 14		X, 14		X, 14	
Anal	III, 9		III, 9		III, 9		III, 9	
Caudal	+ 17 +		+ 17 +		+ 17 +		+ 17 +	
Pectoral	I, 16		I, 15-16		I, 16		I, 16	
Ventral	I, 5		I, 5		I, 5		I, 5	
No. of scales in lateral line	50		50		50		50	
No. of transverse rows above lateral line	9		9		9		9	
No. of transverse rows below lateral line	16		16		16		16	
Weight	15½		8½		5			

Lutjanus Stearnsii, sp. nov., Goode & Bean.

A single specimen of the Mangrove Snapper of Pensacola was sent by Mr. Silas Stearns, to whom the species is dedicated, as a slight acknowledgment of his services in securing for the United States National Museum large collections of fishes from the Gulf of Mexico and fresh waters adjacent to Pensacola, Fla.

Upon this individual (catalogue number 21,337), our description is based, having been drawn up from the fresh specimen. Its length is 19½ inches. Besides the alcoholic preparation, the Museum has also a cast and a color-sketch.

Diagnosis.—This species may be readily distinguished from *L. Blackfordii* by its different color, lower and less compressed body, shorter head, shorter pectorals and ventrals, and by other characters which appear in the table of measurements.

Body similar to that of *L. Blackfordii* in shape. Its greatest height equals length of head, twice length of mandible, and twice that of ventral. Its height at ventrals equals four times width of interorbital area. Least height of tail equals first anal ray and twice the last dorsal ray. Greatest length of head equals greatest height of body, twice length of mandible, and twice ventral length. The width of interorbital area equals one fourth of height at ventrals and two-thirds of least height of tail. Length of snout equals second anal ray. Length of maxillary equals twice length of second dorsal spine, which equals second anal spine. The mandible equals the ventral in length. Eye contained slightly more than six times in greatest length of head.

Distance of dorsal from snout equals three times, and base of spinous dorsal twice length of snout. First dorsal spine about equal to first anal. Second dorsal spine equals second anal and twice first anal.

Longest dorsal spine (fourth) equals one-third of greatest length of head. Last dorsal spine about equal to half distance from snout to centre of orbit. Base of soft dorsal equals three times second spine of dorsal. First ray of dorsal equals three-fourths of first anal ray, which equals least height of tail. Longest dorsal ray (fourth) equals twice diameter of eye, and the last equals half of least height of tail.

Distance of anal from snout equals slightly more than six times least height of tail; its length of base somewhat exceeds length of second anal ray. First anal spine equals half the second, which is half the length of upper jaw. Third anal spine equals half second anal ray, which equals length of snout. First anal ray equals least height of tail; second equals length of snout, and last equals half length of snout.

Middle caudal rays equal one-sixth and superior external rays one-fourth of total length. Inferior external rays slightly less than length of pectoral.

Distance of pectoral from snout about equal to length of head. Its length almost twice least height of tail.

Distance of ventral from snout nearly three times length of snout; its length equals half length of head.

Racial Formula.—B. VII; D. X, 14; A. III, 8; C. + 17 +; P. I, 15; V. I, 5.

Scales.—6, 45, 14.

Color.—General color scarlet below, shading into reddish or purplish brown above. Plum color on sides and top of head. Below the lateral line, the posterior half of the exposed portion of the scales is white tinted with scarlet; the basal portion reddish and much darker. Under part of head light scarlet. Vertical fins darker than the body. Pectoral and ventral white roseate.

Teeth.—Vomerine teeth in a patch shaped like a spear, with concave cutting edges and acutely produced angles.

Table of Measurements.

Current number of specimen	21,337.	
Locality	Pensacola, Fla.	
	Millim.	100ths.
Extreme length without caudal	430	
Length to end of middle caudal rays	501	(19½ in.)
Body:		
Greatest height		34
Height at ventrals		32
Least height of tail		12
Head:		
Greatest length		34
Width of interorbital area		8
Length of snout		13
Length of operculum		11
Length of maxillary		14
Length of mandible		17
Distance from snout to centre of orbit		15½
Diameter of eye		5½
Dorsal (spinous):		
Distance from snout		39½
Length of base		26
Length of first spine		3½
Length of second spine		7
Length of longest spine	(4th)	11½
Length of last spine		7½
Dorsal (soft):		
Length of base		21
Length of first ray		9
Length of longest ray	(4th)	11
Length of last ray		6
Anal:		
Distance from snout		73
Length of base		13½
Length of first spine		3½
Length of second spine		7
Length of third spine		6½
Length of first ray		12
Length of longest ray	(2d)	13
Length of last ray		6½
Caudal:		
Length of middle rays		16½
Length of external rays	{ superior	25
	{ inferior	23
Pectoral:		
Distance from snout		33½
Length		23½
Ventral:		
Distance from snout		38½
Length		17
Branchiostegals	7	
Dorsal	X, 14	
Anal	III, 8	
Caudal	+ 17 +	
Pectoral	I, 5	
Ventral	I, 15	
Number of scales in lateral line	45	
Number of transverse rows above lateral line	6	
Number of transverse rows below lateral line	14	

A NOTE ON THE GULF MENHADEN, BREVOORTIA PATRONUS, GOODE.

By SILAS STEARNS.

The Gulf Menhaden are first seen about Pensacola in April. They enter the harbor in small schools, swimming at the surface, rippling the water as they go. I have never seen any large schools, perhaps not more than four or five barrels in one body; but the number of small schools which might be seen in a few hours at the right place and in a

favorable time would make an immense school or schools, if consolidated. The fishermen report them in small bunches outside and offshore. I have never seen one in the spring which would measure over six inches, and the greater number measure less than that; all the fishermen confirm this.

They seem to stay in brackish water until they get accustomed to the change, and lose their parasite,* and then go directly into the fresh water. About May 27, I hauled a seine in a fresh-water stream near the head of the bay, and caught nearly a barrel of *Breroortia patronus*. Their color was darker, and I did not find any parasites in their mouths. Their stomachs were full of food, but I could find no traces of spawn or milt. I do not know exactly when they return from fresh water, but last October Major Staples and I caught about two dozen in a gill-net with a mesh of $3\frac{1}{2}$ inches. I remember that they were gilled very hard, and therefore judge that they must have been quite large. I am quite positive that they belonged to the same species.

PENSACOLA, FLA., June 6, 1878.

A NOTE UPON THE BLACK GROUPER (*EPINEPHELUS NIGRITUS* (HOLBROOK) GILL) OF THE SOUTHERN COAST.

By G. BROWN GOODE and TARLETON H. BEAN.

Among the specimens from Pensacola sent by Mr. Stearns, there is the "Jew-fish" of West Florida, said to attain the weight of three or four hundred pounds.

The specimen (No. 21,329) measures in length 29 inches, and weighs 16 pounds. It was described while in a fresh condition.

SYNONYMY.

Serranus-nigritus, HOLBROOK, Ichthyology of South Carolina, p. 173, pl. xxv, fig. 2.—
GÜNTHER, Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum, I, 1859, p. 134.

Epinephelus nigritus, GILL, Proceedings of the Academy of Natural Sciences of Philadelphia, 1865, p. 105; Report of the U. S. Commissioner of Fish and Fisheries for 1871-72, 1873, p. 806; Catalogue of the Fishes of the East Coast of North America, 1873, p. 28.

DESCRIPTION.

Diagnosis.—Body oblong, thick, tapering very gradually from the insertion of the dorsal and the end of the ventral. Its greatest height (behind ventrals) is contained three and one-sixth times in total length (caudal included) and about equal to length of head. The height of body at ventrals is slightly greater than one-third of total length with-

*This species is infested by the same parasite which is so common in the mouths of the common Menhaden in Southern waters, the *Cymothoa prægustator* (Latrobe) Say.

out caudal, double the greatest width of the body, and three times the least height of tail.

Head a trifle longer than greatest height of body and slightly less than twice the length of the pectoral. The width of the interorbital area is half that of the head, and nearly double the diameter of the eye. The length of the snout is about equal to that of the operculum. The preoperculum is finely serrated on its posterior limb, slightly produced at the angle, the edge of which is obtusely rounded, and armed with stronger denticulations. Upon the inferior limb in front of the angle is one stout spine. Lips scaleless. Maxillary with a few minute scales arranged in a narrow band. Length of the upper jaw nearly half the length of head and quite half the greatest height of the body. Length of mandible about double that of the operculum. Length of mandible slightly more than that of pectoral.

Eye circular, its diameter nearly nine times in length of head and nearly twice in width of interorbital space. Its anterior margin is midway between the tip of the snout and the posterior edge of the preoperculum.

Dorsal as far from the snout as ventral, its length of base three-fourths that of the head. The length of the first spine slightly exceeds the diameter of the eye, the second spine is as long as the base of the anal fin and about equal to the longest anal ray. The length of the last spine is twice that of the first. The length of base of soft dorsal is four-fifths that of the spinous dorsal, which is exactly double the length of the longest dorsal ray. The last ray is half as long as the first ray of the anal.

The distance of the anal from the snout is three-fourths of the length of the body without caudal. Its length of base is equal to the length of the second dorsal spine. The relations of the length of the spines and rays of the anal fin are exhibited in the table of measurements.

Caudal fin rounded, its middle rays half as long as the head, the exterior rays slightly shorter.

The pectoral is very broad and rounded, its insertion considerably in advance of the end of the opercular flap. Its length slightly exceeds that of the middle caudal rays.

Ventrals broad, distant from snout three-eighths of the length of the body and as long as the pectoral. The ventral spine is as long as the last dorsal spine.

Scales of moderate size, with minute pectinations, truncate at the attached end. When detached, their shape is nearly oblong.

Color, dusky brown above, lighter below; fins darker; no traces of markings upon body or fins.

Table of Measurements.

Current number of specimen.....	21,329.	
Locality.....	Pensacola, Fla.	
	Millim.	100ths.
Extreme length..... (29 inches).....	610	
Length to end of middle caudal rays.....	735	
Body:		
Greatest height.....		39
Greatest width.....		17
Height at ventrals.....		35
Least height of tail.....		12
Head:		
Greatest length.....		40
Greatest width.....		17½
Width of interorbital area.....		8½
Length of snout.....		10
Length of operculum.....		11
Length of maxillary.....		19½
Length of mandible.....		22½
Distance from snout to orbit.....		13½
Diameter of orbit.....		4½
Dorsal (spinous):		
Distance from snout.....		37½
Length of base.....		31
Greatest height.....		16½
Length of first spine.....		5
Length of second spine.....		16½
Length of last spine.....		10
Dorsal (soft):		
Length of base.....		24½
Length of first ray.....		14
Length of longest ray (seventh).....		15½
Length of last ray.....		7
Anal:		
Distance from snout.....		76
Length of base.....		16½
Length of first spine.....		2½
Length of second spine.....		6½
Length of third spine.....		9½
Length of first ray.....		14½
Length of longest ray (second).....		16
Length of last ray.....		9
Caudal:		
Length of middle rays.....		20½
Length of external rays.....		19½
Pectoral:		
Distance from snout.....		35
Length.....		21½
Ventral:		
Distance from snout.....		37½
Length.....		21½
Branchiostegals.....	7	
Dorsal.....	X, 15	
Anal.....	III, 9	
Caudal.....	+ 17 +	
Pectoral.....	2, 16	
Ventral.....	I, 5	
Number of scales in lateral line.....	115	
Number of transverse rows above lateral line.....	24	
Number of transverse rows below lateral line.....	52	

WASHINGTON, June 1, 1878.

CATALOGUE OF THE BIRDS OF ST. VINCENT, FROM COLLECTIONS MADE BY MR. FRED. A. OBER, UNDER THE DIRECTIONS OF THE SMITHSONIAN INSTITUTION, WITH HIS NOTES THEREON.

By GEORGE N. LAWRENCE.

Before Mr. Ober's final visit to Dominica, he made collections in Antigua and Barbuda. These were left with the United States consul at Antigua, to be forwarded to the Smithsonian Institution when there was an opportunity to do so. This was in September, 1877; but they have not yet been received.

After completing his investigations in Dominica, he went to St. Vincent, whence he writes under date of October 9:—"As soon as I reached the mountains I was taken sick. It has been quite discouraging. I have suffered from another attack of fever. I feel pretty well now, and hope to keep so." He wrote under date of December 10:—"I expect to leave for Grenada January 15." But unfortunately he had a relapse of fever, by which he was completely prostrated, as, in a letter dated January 25, he says:—"I am just convalescing from a long fever; camping in this very wet weather brought it on. I have been laid up since December 19. I lost all my flesh, and was so weak when I first left my bed that I could scarcely stand. Though I have been here a long while, I have accomplished little, owing to the rains and the actual impossibility of working the woods then, without a pull-up such as I am getting. I hope to be all right in a week, and, as drier weather is at hand, to rapidly finish this island, and then push through the Grenadines to Grenada. From there, retrace my steps here for mails, &c., and then go to Martinique."

Mr. Ober's long sickness, together with the rains, prevented him from making but a moderate collection at St. Vincent. He was to leave for Grenada on the 29th of February.

The collection from St. Vincent was kindly taken in charge by Rear-Admiral Trenchard, commanding the United States steamer Powhatan, early in March. It was received at the Smithsonian on the 25th of that month, and forwarded to me a few days thereafter. It consists of but ninety specimens, and some of the species are poorly represented in numbers.

The subjoined account from Mr. Ober, of the geographical position of the island, with its natural and zoological peculiarities, seems to convey valuable information. This, with his observations on the habits of birds, &c., are indicated by quotation-marks:—

"St. Vincent, February 28, 1878. This island lies in latitude $13^{\circ} 15'$ north and longitude $61^{\circ} 10'$ west. It is about 100 miles due west of Barbadoes, and is one of the long chain of volcanic islands extending from latitude $17^{\circ} 50'$ north to latitude 12° north.

"Like Dominica, Guadeloupe, Martinique, St. Lucia, and Grenada, it is very mountainous; nearly the whole surface is tossed with hills, and even the level land, as it is called, is of this character.

"Like the other islands of the chain, it has a longitudinal axis in the shape of a range of hills extending its entire length. Here and there are peaks approaching the dignity of mountains, the highest about 3,000 feet. In the northern part is the famous 'Souffriere', a mountain with a crater a mile in diameter, a slumbering volcano which, in 1812, by a tremendous eruption, spread havoc and ruin all around it. Before this eruption, the mountain was probably much higher than at present, as the top was blown completely off and a new crater opened. Evidence of its work may be seen at the present day in the deep gullies scooped out of the mountain side and the plain beneath by the lava flow in its great rush to the sea. I counted five of these dry rivers in sailing along the leeward coast. The most extensive is on the windward coast, at least 300 yards in width.

"St. Vincent has more cultivable land than Dominica, owing to the windward side sloping gradually from the foot hills to the sea, a tract from one to two miles in width of undulating surface, though rough and elevated in places.

"As will be seen, the avifauna resembles much that of Dominica—some birds of the same species in greater or less abundance, a few replaced by others of near affinity, and one or two new forms.

"The Island Parrot *Chrysotis guildingi* is peculiar to this island, but I doubt if there are other birds whose habitat is restricted to this small range. Were I possessed of all the information I hope to get by the time my investigations are completed, I might speak of the peculiarity of these insular faunæ, by which I find, in islands separated by a narrow breadth of water—say, from 15 to 30 miles—birds found in one that never visit the other. Notable examples could be given, but I wish to speak authoritatively and from more extended experience.

"It is strange that in an island more than two degrees south of Dominica, I find so little difference in the plumage of birds; hardly any increase of those tropical species of bright plumage, which are so abundant further south in Tobago and Trinidad. In fact, so far as the fauna of each island is concerned, and in external character of surface and soil, and even in the component elements of the latter, Dominica and St. Vincent could scarcely be more alike. To a superficial observer these facts are apparent, as well as to one who studies them.

"In numbers, as well as in species, this island is greatly deficient. To what cause to attribute this disparity when the forests and fields teem with bird-food, and islands further south teem with birds, I am at a loss. Perhaps the reason may appear later, in the process of careful investigation.

"The most striking instance of the absence of any particular form or family, is that of the Picidæ. Countless trees, decaying and dead, under the influence of a never-ceasing destructive power, which would afford food for thousands of birds; which are infested and alive with ants, borers, &c., found in every forest. Not a woodpecker; millions of nut-

and seed-producing trees, and you may look in vain for any member of the squirrel family.

"And among birds and among quadrupeds, there is no animal here that takes their places.

"These few notes, hasty and crude, may aid in the conception of the appearance of animal life here, and only for that purpose are they offered.

"I send, by the same conveyance with the birds, 46 specimens of Carib hatchets, axes, knives, &c., illustrating the crude state of advancement in which they existed, as compared with their enemies and co-existent tribes of the larger islands.

"Allow me in this connection to acknowledge the courtesy of the officials and planters of St. Vincent. To His Excellency George Dundas, Esq., C. M. G. Lieut. Governor of St. Vincent; Edward Laborde, Colonial Secretary; and to Hon. Henry Shaw, Treasurer of the island, I am especially indebted for facilities in prosecuting my work, as well as for social pleasures that have greatly relieved the tedium of life in a new place.

"To the proprietors and managers of the different estates, I am greatly indebted; to James Milne, Esq., of Rutland Vale, for a residence in the country when recovering from fever; to Messrs. D. K. Porter & Co., Kingstown, for letters of introduction, horses, and men. Finally, it is only incumbent upon me to add that I have received nothing but kind treatment, and have found most unbounded hospitality throughout the island.

"FREDERICK A. OBER."

Fam. TURDIDÆ.

1. *Turdus nigrirostris*, Lawr., Ann. N. Y. Acad. Sci., vol. 1, p. 147.

"Thrush, ♀. Length, $9\frac{1}{4}$ in.; alar extent, 14; wing, $4\frac{1}{2}$.

"Found on lower ground than *Margarops montanus*. Not numerous."

2. *Margarops herminieri* (Lafr.).

"Have heard the unmistakable whistle of this bird, and have seen it as it flitted by in the dusk of the high woods, but have not obtained it."

3. *Margarops montanus* (Vieill.).

"Found only in high woods and valleys. Not very abundant. I have not seen the larger species of this genus."

4. *Cinlocerthia ruficauda*, Gould.

"Trembleur'. ♂. Length, 9 in.; alar extent, $12\frac{1}{2}$; wing, 4.

"Not so abundant as in the woods of Dominica, but still plentiful
Iris yellow."

5. *Mimus gilvus*, Vieill.

"Mocking bird."

"Male, length, $10\frac{1}{4}$ in.; alar extent, 14; wing, $4\frac{1}{2}$.

"Female, length, $9\frac{3}{4}$ in.; alar extent, $12\frac{3}{4}$; wing, $4\frac{1}{8}$.

"Pretty common in the lowlands and cleared places. In shape and habits it resembles the Mockingbird of the States. Its habit of dodging in and out of the palm tops, recalls the American species. It is vastly inferior in song however, but trills very sweetly a few notes."

There are five specimens in the collection, differing in no respect from an undoubted example of this species from Guiana.

Fam. SYLVIIDÆ.

6. *Myiadestes sibilans*, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 148.

"'Souffriere Bird.'

"Length, ♂, $7\frac{1}{2}$ in.; alar extent, 11; wing, $3\frac{1}{2}$; tail, 3.

"Length, ♀, $7\frac{1}{2}$ in.; alar extent, $11\frac{1}{4}$; wing, $3\frac{1}{2}$; tail, 3.

"This bird has been an object of search for fifty years, and has so long eluded the vigilance of naturalists and visitors to the mountains, that it is called the 'invisible bird'. From being seen only on the Souffriere Mountain, it has acquired the name of the 'Souffriere bird'. It is popularly believed to be found only on the Sulphur Mountain, but is an inhabitant of all the high ridges containing deep woods and ravines. Shy and exceedingly observant, it was not until my third search for it that I captured it. Though I fear the popular belief that it is a resident of this island only is erroneous, still I was piqued at the reputation it held of being invisible, and resolved to capture it. To do this I camped five days and nights on the mountain top, 3,000 feet above the sea, in a cave on the brink of the crater. I got five birds by using all my arts of allurement, calling them within shot by using a call taught me by the Caribs.

"The bird is mentioned in Gosse's Birds of Jamaica, and considered identical with the 'Mountain Whistler' (*Myiadestes genibarbis*) of Dominica and Jamaica. This was merely conjecture, and should it prove nothing else, I can claim the credit of settling the doubt.

"There are differences in the notes of the two birds, though great similarity in their habits. I send you seven specimens."

Mr. Ober quotes Mr. Gosse as considering the St. Vincent bird to be identical with the one inhabiting Jamaica. But Mr. Gosse does not precisely say that, but says concerning it (Birds of Jamaica, p. 200) that he received the following note from Mr. Hill:—"I find among some detached notes of mine the following memorandum respecting a similar bird in the smaller West India islands. 'The precipitous sides of the Souffriere Mountain in St. Vincent,' says a writer describing the volcano which so disastrously broke out there in 1812, 'were fringed with various evergreens, and aromatic shrubs, flowers, and many Alpine plants. On the north and south sides of the base of the cone were two pieces of water, one perfectly pure and tasteless, the other strongly impregnated with sulphur and alum. This lonely and beautiful spot was

rendered more enchanting by the singularly melodious notes of a bird, an inhabitant of those upper solitudes, and altogether unknown to the other parts of the island; hence supposed to be invisible, though it certainly has been seen, and is a species of *Merle*.”

Neither does Mr. Gosse allude to its being similar to the bird found in Dominica. Mr. Ober was misled probably by Mr. Gosse using *M. genibarbis* (which is the correct name for the Dominica species) as a synonym of *M. armillatus*, which he supposed the Jamaica Solitaire to be, but which has been given a distinct name by Professor Baird, viz, *Myiadestes solitarius*.

Fam. TROGLODYTIDÆ.

7. *Thryothorus musicus*, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 149.

“Wren; ‘Wall Bird.’

“Length, $5\frac{1}{2}$ in.; wing, $2\frac{1}{2}$; alar extent, $7\frac{3}{4}$.

“The sweet warble of this lively little bird may be heard morning, noon, and night about the houses and sugar-mills, as well as far up the mountain sides and valleys. It is quite plentiful and often has deceived me in its note, as it was mistaken for that of a warbler. It builds its nest in the walls of houses and holes in trees. Saw one constructing a nest in October. Found on the Souffriere, 3,000 feet above the sea.”

Fam. SYLVICOLIDÆ.

8. *Leucopezia bishopi*, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 151.

“Wren?”

“Length, ♂, $5\frac{3}{4}$ in.; alar extent, $8\frac{1}{2}$; wing, $2\frac{3}{4}$.

“While engaged in my search for the Souffriere bird, I noticed a sprightly little bird that came skipping through the trees at my call. It seemed rather shy, but this may be owing to the presence of man in such a secluded situation, and it was with difficulty I shot two. Since then I have shot another; none of them below 1,000 feet altitude. Its note is very sharp; either the male or the female gives utterance to the syllable, ‘few, few, few,’ etc., eight or ten times, immediately answered by the mate with, ‘whit, whit, whit,’ etc., the same number of times.”

9. *Setophaga ruticilla* (Linn.).

“Not often seen.”

Fam. VIREONIDÆ.

10. *Vireosylvia calidris* var. *dominicana*, Lawr.

“*Vireo calidris*? Everywhere abundant.

“Length, ♂, $5\frac{3}{4}$ in.; alar extent, 9; wing, 3.

“Length, ♀, 6 in.; alar extent, $9\frac{1}{4}$; wing, $3\frac{1}{8}$.”

Fam. HIRUNDINIDÆ.

11. *Progne dominicensis* (Gm.).

"Length, ♂, $7\frac{1}{2}$ in.; alar extent, $15\frac{1}{2}$; wing, $5\frac{3}{4}$.

"I saw the first this month, February, at the same time with, and in the same place as, the Tropic bird (*Phætho*n). I think, however, both are residents."

Fam. CÆREBIDÆ.

12. *Certhiola atrata*, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 150.

"*Certhiola* ?

"Length, ♂, $4\frac{7}{8}$ in.; alar extent, 8; wing, $2\frac{3}{4}$.

"Length, ♀, 4 in.; alar extent, 7; wing, $2\frac{1}{4}$.

"This black species seems to have almost entirely replaced the black and yellow one of Dominica, etc. It is abundant mixing with the 'black bird' (*Loxigilla noctis*) in the cotton-trees and plantains, so as to be hardly distinguished. The love for the flowers of the banana and plantain, and the fruit as well, is the same trait possessed by the Dominica species."

13. *Certhiola saccharina*, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 151.

"*Certhiola*.

"Length, ♂, $4\frac{5}{8}$ in.; alar extent, $7\frac{3}{4}$; wing, $2\frac{1}{2}$.

"Length, ♀, $4\frac{1}{2}$ in.; alar extent, $7\frac{1}{4}$; wing, $2\frac{1}{2}$.

"Not so abundant as the preceding. Called the 'Molasses bird'."

Fam. TANAGRIDÆ.

14. *Euphonia flavifrons* (Sparm.).

"Length, ♂, juv., 5 in.; alar extent, 8; wing, $2\frac{3}{4}$.

"Only observed in the high valleys, and only one seen. A quiet, unsuspicious bird; feeds on a berry known here as the misseltoe, and hence called the 'misseltoe bird'."

15. *Calliste versicolor*, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 153.

"Length, ♂, $6\frac{1}{4}$ in.; alar extent, 10; wing, $3\frac{3}{8}$.

"Length, ♀, 6 in.; alar extent, 10; wing, $3\frac{1}{4}$.

"At 'Carabries', the highest place of residence in the island, I first found this bird, feeding on the gommier seeds and others; frequently flying into the high woods, but remaining principally in the more open tracts bordering the negro provision grounds. In the heat of the day, and when it was windy, they kept more in the low shrubbery, feeding on the seeds of a low bush."

Fam. FRINGILLIDÆ.

16. *Loxigilla noctis* (Linn.).

" 'Black-bird.'

" Length, ♂, $5\frac{1}{4}$ in.; alar extent, 9; wing, 3.

" Length, ♀, 5 in.; alar extent, $8\frac{1}{2}$; wing, $2\frac{3}{4}$.

" The young at first are like the females—gray. Its favorite tree is the silk cotton; it is very plentifully distributed."

There is but one pair of this species in the collection; they are of rather smaller dimensions than examples from Dominica. The bill is also somewhat smaller, but yet very much larger than that of the bird from Guiana, which I called var. *propinqua* in the Dominica catalogue; the last is of a much smaller size.

17. *Phonipara bicolor* (Linn.).

" 'Ground Sparrow.'

" Length, ♂, $4\frac{1}{4}$ in.; alar extent, $6\frac{3}{4}$; wing, 2.

" The most numerous of any species; everywhere it is found, except, perhaps, in the depths of the 'high woods'. It breeds in nearly every month from February to October; its nest is dome-shaped, like nearly all those of small birds in these islands. I procured many nests and eggs in Dominica."

Fam. ICTERIDÆ.

18. *Quiscalus* ?

" A bird called the 'Bequia Sweet', from its note; a black bird, much resembling the Crow Blackbird, though smaller, the female the color of the female Cowbird; is plentiful in the adjacent keys, and a few have been blown here by storms."

Fam. TYRANNIDÆ.

19. *Elainea martinica* (Linn.).

" Flycatcher.

" Length, ♂, $6\frac{7}{8}$ in.; alar extent, 11; wing, $3\frac{1}{2}$.

" The most common of these birds; much frequents the silk-cotton tree and the low bushes on hill sides."

20. *Myiarchus oberi*, Lawr.

" Flycatcher; 'Piperee.'

" Length, ♂, $8\frac{1}{2}$ in.; alar extent, $12\frac{1}{2}$; wing, 4.

" A companion of the preceding species, and found in the same localities."

21. *Tyrannus rostratus*, Sel.

" Piperee.

" Length, ♂, 9 in.; alar extent, $15\frac{1}{2}$; wing, $4\frac{3}{4}$.

" Common in town and country."

Fam. TROCHILIDÆ.

22. *Eulampis jugularis* (Linn.).

"Few are seen below the high valleys, and there, even, it is by no means common."

23. *Eulampis holosericeus* (Linn.).

"Exceedingly scarce, and like the above species found more frequently in the highlands than in the lowlands."

24. *Orthorhynchus ornatus*, Gould?

"'Doctor bird.' *O. exilis*?"

"The only species which is numerous, especially in the gardens. The most interesting Hummingbird's nest I have yet seen is one of this bird's, being attached to a hanging rope, and containing two eggs; found in October."

Mr. Ober sent but one pair of this species, which he queries if not *O. exilis*. The male agrees closely with *O. ornatus*, Gould, as described and figured by him (Mon. of Trochilidæ), having the ends of the crest-feathers decidedly blue.

Mr. Elliot (Ibis, 1872, p. 355) remarks as follows:—"This species, if it is really entitled to such a distinction, is found exactly between *O. cristatus* of Barbadoes and St. Vincent, and *O. exilis* of the Virgin Islands and Nevis. It has perhaps a little more blue upon the crest; but if the locality is wanting, it is not an easy matter to separate specimens from *O. exilis*, to which the present bird bears a close resemblance."

Mr. Elliot gives as its localities "Martinique and St. Lucia", and names "St. Vincent and Barbadoes" as the homes of *O. cristatus*. I have *O. cristatus* from Barbadoes, but the bird now sent from St. Vincent agrees well with *O. ornatus*, and Mr. Ober states that it is the only species of *Orthorhynchus* found there, and is abundant. I have not seen specimens of this genus from either Martinique or St. Lucia. I have examined examples of *O. exilis* from several islands, and they have been remarkably uniform in appearance, the ends of the crest-feathers being bluish-green, while in *O. ornatus* the termination of the crest is of a clear blue; in each the color of the tip gradually merges into the golden-green of the other portion of the crest. In *O. cristatus*, the two colors of the crest, violet-blue and golden-green, are about equally and trenchantly divided.

Fam. CYPSELIDÆ.

25. "Chætura?"

"Skims the country everywhere; is different from the Dominica species. Nests have been found in chimneys in the country districts."

Fam. **ALCEDINIDÆ.**

26. *Ceryle alcyon* (Linn.).

"Not abundant. The same habits as the Northern Kingfisher; must be a resident. Have seen it in Dominica in April and September; here from October to February."

Fam. **CUCULIDÆ.**

27. *Coccyzus minor* (Gm.).

"'Cuckoo, Manioc.'

"Wherever there is a field with low bushes, or dense clumps of mangoes with open spaces intervening, on hillsides as well as plains, this bird may be found. Its peculiar cry is said to be heard always before a rain, giving it the name of 'Rain Bird'—a name, however, not confined to this species, as local names are given without any reason, except the fancy of the people bestowing it."

28. *Crotophaga ani*, Linn.

"'Tick Bird.' 'Chapman Bird.'

"Introduced, but assimilates well. A lazy, unsuspicious bird, frequenting cattle-fields, and delighting to congregate in bunches of half a dozen or so in the tops of small trees. Is said to eat the cattle ticks, and for this purpose was introduced. Is always in a state of emaciation, but the stomach is generally well filled with ticks and small Coleoptera."

Fam. **PSITTACIDÆ.**

29. *Chrysotis guildingi* (Vigors).

"Length (fresh), ♂, 18½ inches; alar extent, 32½; wing, 10½; tail, 7¾.

"Length (fresh), ♀, 19 inches; alar extent, 33; wing, 11.

"Is confined to the great central ridge running through the island; on this, and on the thickly wooded spurs this parrot is found. Like the Ramier, it feeds in the tops of the highest trees, and its season of good condition is the later months in the year. Mates in February, March, and breeds in April and May. Is then most easily approached, though ever shy and vigilant. Is sometimes caught (but only by breaking a wing by a shot) and takes kindly to confinement. The governor of St. Vincent, G. Dundas, Esq., C. M. G., has two which can articulate a few words. As a rule, however, they are difficult to teach. This is the only species on the island."

I have appended a description of this rare and beautiful species.

Male.—The sinciput is of an ashy-white; the feathers of the top of the head have their bases pale orange, which color increases until on the occiput the feathers are entirely of a fine orange; lores and around the eye grayish-white; cheeks pale orange; the feathers of the sides of the neck and throat are orange at base, terminating with pale blue; the feathers

of the hind neck are light olive-green, orange at base, and terminating conspicuously with black; back, rump, and smaller wing-coverts of a brownish-rufous or bay color, the feathers narrowly edged with black; the tail-feathers are varied with dark green and blue, with their bases bright orange and their ends dirty pale orange; the terminal half of the primaries is black, the basal portion orange-yellow; the speculum on the secondaries is of a deep orange, succeeded by green and then dark blue on the outer webs to their ends; the inner webs are black; the tertials are olive green, with the outer webs of a lighter blue; edge of the wing orange; the breast and sides are of a duller bay color than the back, and the abdomen dull olive-green; all the feathers edged with black; the under tail-coverts are dull orange, ending with green; the bill is horn-white, the end of the upper mandible dusky, and the sides with just a tinge of orange; feet dark ash.

The female does not differ essentially in plumage from the male, except that the sinciput is whiter and the throat of a clearer orange, possibly due to difference of age.

Each specimen is labelled—"Parrot. J. Kirkland, Esq., Langby Park, Dec. 15, 1877."

Fam. STRIGIDÆ.

30. *Strix flammea* var. *nigrescens*, Lawr.

"Owl. 'Jumbie Bird.'

"Length, ♀, 12 in.; alar extent, 32; wing, 10.

"There are two species, it is said; but I have seen but this one, and doubt whether there be another. Evidence from the natives should never be accepted without proof. This species is a frequenter of cliffs. I know nothing of its habits."

Fam. FALCONIDÆ.

31. *Pandion haliaetus* (Linn.).

"Not seen, but said to appear along the coast to the windward."

32. *Buteo pennsylvanicus* (Wils.).

"Everywhere abundant. Called the 'Chicken Hawk'. Every specimen yet examined very light in color, except the last."

33. *Urubitinga anthracina* (Nitzsch) ?

"Black Hawk."

"Length, ♂, juv., 21 in.; wing, 15; tail, 9; tarsus, 3½. Cumberland Valley, Feb. 1, 1878.

"An inhabitant of the mountains and higher valleys, feeding on crabs, cray-fishes, etc., and frequenting the mountain streams. This specimen is evidently not in mature stage of plumage. They are very shy, little seen, not molesting poultry. A young one of this species has been sent to the London Zoological Gardens.

"One pointed out to me as the Black Hawk had the shape and appearance of the Black Vulture (*Cathartes atratus*); the short tail and peculiar flight. This not according with my observations of the hawk previously, in the forest, leads me to think that it was *C. atratus*. If so, it is the first seen. A 'Black Hawk' I had before seen had all the appearance of the American Duck Hawk. They breed on a shelf of some high cliff."

The single specimen sent is immature, but it does not agree satisfactorily with a Mexican example of *U. anthracina*, in a somewhat similar stage of plumage, and if *U. gundlachi* inhabiting Cuba is a distinct species, a comparison with that will be necessary to determine its true position.

It is (though a male) rather larger, and apparently stouter, with a shorter wing than the specimen from Mexico, which is a female; it is blacker, with the bands on the tail less in number and double the width of those on the tail of the Mexican bird; but there is probably a difference of age, and, without precise knowledge on this point, a comparison is unsatisfactory.

The specimen alluded to by Mr. Ober as having been sent to the Zoological Society of London is doubtless the one spoken of by Mr. J. H. Gurney (Ibis, 1876, p. 487); he says:—"I may also mention that a specimen of *U. anthracina* from the island of St. Vincent is now living in the Gardens of the Zoological Society; this example was in immature dress when it arrived at the Gardens, but is now in full plumage, with the exception of a slight tinge of rufous brown on the back and sides of the head, and also on the tertials," etc.

On page 488 he also remarks:—"The *Urubitinga* found in Cuba was erected into a distinct species by Cabanis, who assigned to it the specific name of *gundlachi* (vide Journ. für Orn. 1854, p. 80); this, however, is treated by Mr. Sharpe as a synonym of *U. anthracina*, whether correctly or not I cannot say, as I have never seen a *Urubitinga* from Cuba," etc.

Fam. FREGATIDÆ.

34. *Fregata aquila* (Linn.).

"A common sight is that of the 'Man-o'-war Bird' flying high above the water. It breeds in numbers on the island of Balliceaux, 15 miles distant from St. Vincent."

Fam. PHÆTHONIDÆ.

35. *Phæthon æthereus*, Linn.

"Length, ♂, 37 in.; alar extent, 38; wing, 12½.

"Breeds in the cliffs on the Leeward coast; habits, etc., same as the Dominica bird. I found this species in great numbers, at Balliceaux, a small key near St. Vincent; found a young bird and one egg; they breed later in the season."

Fam. PELECANIDÆ.

36. *Pelecanus fuscus* (Linn.).

"Length, ♂, 46 in.; alar extent, 80; wing, 20.

"Seen off the coast, but not in any abundance."

37, *Sula fiber* (Linn.)?

"An inhabitant of the Leeward coast."

Fam. ARDEIDÆ.

38. *Ardea herodias*, Linn.

"Visits the island, but not often seen; called the 'Gray Heron'."

39. *Garzetta candidissima* (Gm.).

"Very few ever seen."

40. *Florida cærulea* (Linn.).

"In small numbers."

41. *Butorides virescens* (Linn.).

"Length, ♀, 17 in.; alar extent, 25; wing, 7.

"Common; the only Heron plentiful."

Fam. COLUMBIDÆ.

42. *Columbo corensis* (Gm.).

"Length, ♀, 16 in.; alar extent, 25½; wing, 8¾.

"Abundant, but shy; inhabits the high woods. Feeds on the berries of the gommier tree and many others. Is in best condition in November and December; but most easily obtained in February and March, when the woods resound with its call notes and loud cooing. Is strictly arboreal, never touching the earth."

43. *Zenaida martinicana*, Bp.

"Length, ♀, 10½ in.; wing, 5¾; tail, 3½.

"'Turtle Dove.' Balliceaux Island, near St. Vincent. Breeding abundantly."

44. *Chamæpelis passerina* (Linn.).

"Length, ♂, 6¾ in.; alar extent, 10½; wing, 3½.

"Abundant, more so than in Dominica; especially will it be found in rocky situations near the shore."

45. *Geotrygon montana* (Linn.).

"Length, ♂, 10½ in.; alar extent, 18; wing, 6½.

"Length, ♀, 9½ in.; alar extent, 16½; wing, 5½.

"Rather plentiful in the high woods, where only it resides. Is as

strictly terrestrial as the Ramier is arboreal. Feeds on fallen seeds mostly; when alarmed, springs into a tree, or flies a short distance and alights in a low tree, whence it soon seeks the ground."

Fam. RALLIDÆ.

46. *Porphyrio martinicus* (Linn.).

"*Gallinula martinica*? Seen by me in October, but not obtained. One has since been shot in Dominica, and is awaiting my return there. It is undoubtedly the same species as this."

Fam. CHARADRIIDÆ.

47. *Squatarola helvetica* (Linn.).

"Autumn migrations."

48. *Charadrius virginicus*, Borkh.

"Visits the island in the months of September and October, but does not remain. There are few open fields, rounded hills, or lowlands, so that the Plover make but a very short stay."

49. *Ægialitis semipalmata* (Bp.).

50. *Streptilas interpres* (Linn.).

"In October."

Fam. SCOLOPACIDÆ.

51. *Himantopus nigricollis* (Vieill.).

52. *Gallinago wilsoni* (Temm.).

"Only in winter months."

53. *Tringa minutilla*, Vieill.

54. *Calidris arenaria* (Linn.).

55. *Gambetta flavipes* (Gm.).

56. *Tringoides macularius* (Linn.).

"Length, ♂, 7 in.; alar extent, 12; wing, 4.

"A visitant; remains through the winter months. Some few may remain the whole year; not very plentiful."

57. *Numenius longirostris* (Wils.).

"Of the preceding, eight species are on the authority of a resident. There is no doubt that they occur. All are migrants, visiting only in autumn."

Fam. LARIDÆ.

58. *Sterna maxima*, Bodd.

"*Sterna regia*."

"I am very sure that the Tern seen here is of this species, though I have not yet obtained it."

Fam. PODICIPITIDÆ.

59. "Podiceps?"

"A species of 'diver' is often spoken of as occurring during the autumn months. I have not obtained it."

"A few ducks and one species of teal visit this island, but do not remain. There are few ponds or bodies of water, no salt-water lagoons and no marshes of any extent, so that all kinds of water fowl soon leave for better feeding grounds."

NEW YORK, July 22, 1878.

**DESCRIPTION OF A NEW SPAROID FISH, *SARGUS HOLBROOKII*,
FROM SAVANNAH BANK.**

By TABLETON H. BEAN.

A preliminary description of this species was published in *Forest and Stream*, June 13, 1878. Mr. G. Brown Goode, Assistant Curator of the United States National Museum, found it on the 29th of March, 1878, in the market of Charleston, S. C., where it is known as the "Bream". Prof. D. S. Jordan has recently collected the species at Beaufort, N. C.

The description is drawn from the six specimens (United States National Museum Catalogue, Fishes, No. 20,979) sent by Mr. Goode from Charleston. These specimens range from 256 to 300 millimetres ($10\frac{1}{12}$ to $11\frac{3}{8}$ inches) in length to end of middle caudal rays. This measurement is the basis of comparison for all the rest.

The species is dedicated to John Edwards Holbrook, M. D., author of the "Ichthyology of South Carolina", &c., &c.

Sargus Holbrookii, Bean, *sp. nov.*

Body ovate, resembling *Sargus vulgaris*, Geoffr., in shape, rather than *S. caudimacula*, Poey, compressed, a very slight protuberance above the upper anterior margin of the orbit, and a very marked one in the supra-occipital region. Height of body at ventrals, measured from origin of ventral to origin of spinous dorsal, is contained slightly less than $2\frac{1}{2}$ times in length of body, and usually equals the distance of the dorsal from the end of upper jaw. Least height of tail is about equal to length of middle caudal rays, slightly exceeds the length of upper jaw, and is contained from 10 to $10\frac{1}{2}$ times in total length.

Greatest length of head is contained $3\frac{3}{4}$ times in total length. Inter-orbital area is about $\frac{1}{3}$ of length of head. Snout, measuring from end of upper jaw to perpendicular through anterior margin of orbit, is $\frac{1}{10}$ of total length, and about equals mandible. Length of maxillary nearly equals length of middle caudal rays. Mandible is contained $9\frac{3}{4}$ times in total length. The eye is contained $4\frac{1}{6}$ times in head, and almost 16 times in total length.

Distance of spinous dorsal from end of upper jaw is nearly equal to height of body at ventrals. Longest dorsal spine is contained from $8\frac{1}{2}$ to 10 times in total length. The first dorsal spine does not equal the first anal, and is contained from $1\frac{1}{3}$ to 2 times in the second dorsal spine. The last dorsal spine equals longest dorsal ray. The rays of the soft dorsal gradually diminish in length from the first to the last but one, which is shorter than the last.

Distance of anal from snout is contained $1\frac{5}{8}$ times in total length. The first anal spine is usually $\frac{1}{2}$ the length of the second, which is somewhat longer and stronger than the third. The second anal spine is contained 12 times in total length. The third anal spine is, in most cases, scarcely greater than the last dorsal spine. The anal rays diminish in length to the one before the last, which does not equal the last.

The middle caudal rays are about $\frac{5}{12}$ as long as the external rays, and $\frac{1}{10}$ of total length.

The distance of pectoral from snout is contained $3\frac{1}{2}$ times and its length about 3 times in total length.

The distance of ventral from snout is about $\frac{7}{20}$ of total length. Ventral length is usually twice length of snout.

Radial Formula.—B. VI; D. XII, 13—14; A. III, 13—14; P. 15—16; V. I, 5.

Scales.—8, 60—62, 16.

Teeth.—Eight incisors in each jaw; their greatest width equal to half their length. Many small, granular teeth behind the incisors. Three rows of molars in the upper jaw; two in the lower. Two of the specimens examined show a slight tendency to increase the number of rows of molars.

Color.—Dorsal, caudal, anal, ventrals, axil of pectoral, posterior border of operculum, blackish. A black spot on the caudal peduncle, extending almost as far below as above the lateral line, and involving about eight longitudinal rows of scales. Upper part of head very dark brown. Cheeks and greater part of body dull silvery. No cross-bands. I have not seen the living fish.

Notes.—In the table of measurements, all the measurements except the first are given in hundredths of length to end of middle caudal rays.

Mr. Goode informs me that the "Bream" was abundant in Charleston market at the time of his visit, and that it met with a ready sale.

Prof. D. S. Jordan, writing from Beaufort, N. C., has kindly furnished me the following information concerning the species:—

"There is a species of *Sargus*, very abundant here, which I take to be your *S. Holbrookii*, as I know of no other *Sargus* on our coast." (From the description which Professor Jordan includes in his letter, I have no difficulty in recognizing the *Sargus* which he has observed as *S. Holbrookii*.) "This fish abounds off the wharves here. . . . The fishermen call it Pinfish (Pinfish?), not distinguishing it from *Lagodon*. I have obtained 50 or more specimens, all of them about 3 inches long; none over four. Color silvery; bluish above; a few rather faint narrow dark bars along the sides and a broad and conspicuous dark blotch at base of caudal peduncle above, extending down the sides like a bar. Specimens seen, all small. The black bar on the caudal peduncle is very conspicuous. The fish may be known by this spot when in the water."

Table of Measurements.

Current number of specimen.....	20,979 a.	20,979 b.	20,979 c.	20,979 d.	20,979 e.	20,979 f.
Locality	Savannah Bank, Charleston.					
Length to end of middle caudal rays....millimetres.	256	278	300	274	261	264
Body:						
Height at ventrals .....	.41	.41	.41 $\frac{1}{2}$	.41	.42	.42
Least height of tail .....	.09 $\frac{1}{2}$	.09 $\frac{1}{2}$	.09 $\frac{1}{2}$	.03 $\frac{1}{2}$	.10	.09 $\frac{1}{2}$
Head:						
Greatest length .....	.26 $\frac{1}{2}$	.26 $\frac{1}{2}$	.26 $\frac{1}{2}$	.26 $\frac{1}{2}$	.26 $\frac{1}{2}$	.26 $\frac{1}{2}$
Width of interorbital area .....	.08 $\frac{1}{2}$	.09	.08 $\frac{1}{2}$	.09	.09	.09
Length of snout .....	.10	.10	.10	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$	.10
Length of maxillary .....	.09	.09 $\frac{1}{2}$	.09 $\frac{1}{2}$	.09	.09 $\frac{1}{2}$	.09 $\frac{1}{2}$
Length of mandible .....	.10	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$
Diameter of eye .....	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$	.06 $\frac{1}{2}$
Dorsal (spinous):						
Distance from snout .....	.41	.41 $\frac{1}{2}$	.41	.39 $\frac{1}{2}$	.44	.41
Greatest height .....	.10	.10 $\frac{1}{2}$	.12	.11	.11	.10 $\frac{1}{2}$
Length of first spine .....	.04	.04	.03 $\frac{1}{2}$	.03 $\frac{1}{2}$	.03 $\frac{1}{2}$	.04 $\frac{1}{2}$
Length of second spine .....	.05 $\frac{1}{2}$	.07	.07	.06 $\frac{1}{2}$	.06	.05 $\frac{1}{2}$
Length of last spine .....	.07 $\frac{1}{2}$	.07	.07	.08	.07 $\frac{1}{2}$	.07 $\frac{1}{2}$
Dorsal (soft):						
Length of first ray .....	.07	.07	.07	.08	.07	.07
Length of longest ray .....	.07 $\frac{1}{2}$	.07	.07	.08	.07	.07
Length of last ray .....	.06 $\frac{1}{2}$	.07	.07	.08	.07	.07
Anal:						
Distance from snout .....	.62	.62	.60 $\frac{1}{2}$	.62 $\frac{1}{2}$	.62 $\frac{1}{2}$	.62
Length of first spine .....	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.05	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$	.04 $\frac{1}{2}$
Length of second spine .....	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08
Length of third spine .....	.07 $\frac{1}{2}$	.07 $\frac{1}{2}$	.08 $\frac{1}{2}$	.07 $\frac{1}{2}$	.08 $\frac{1}{2}$	.07 $\frac{1}{2}$
Length of first ray .....	.07 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08	.07 $\frac{1}{2}$	.08 $\frac{1}{2}$	.07 $\frac{1}{2}$
Length of longest ray .....	.07 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08	.07 $\frac{1}{2}$	.08 $\frac{1}{2}$	.07 $\frac{1}{2}$
Length of last ray .....	.06 $\frac{1}{2}$	.07	.07	.08	.06 $\frac{1}{2}$	.06
Caudal:						
Length of middle rays .....	.09 $\frac{1}{2}$	.10	.09 $\frac{1}{2}$	.10	.09 $\frac{1}{2}$	.10
Length of superior external rays .....	.24	.24 $\frac{1}{2}$	.24 $\frac{1}{2}$	.24	.24	.24 $\frac{1}{2}$
Pectoral:						
Distance from snout .....	.28 $\frac{1}{2}$	.28	.28	.28	.29 $\frac{1}{2}$	.28
Length .....	.32 $\frac{1}{2}$	.34	.33 $\frac{1}{2}$	.31 $\frac{1}{2}$	.34	.30 $\frac{1}{2}$
Ventral:						
Distance from snout .....	.34 $\frac{1}{2}$	.34 $\frac{1}{2}$	.36	.35 $\frac{1}{2}$	.36 $\frac{1}{2}$	.35
Length .....	.18	.20	.21 $\frac{1}{2}$	.19 $\frac{1}{2}$	.20	.19
Branchiostegals	VI	VI	VI	VI	VI	VI
Dorsal	XII, 13	XII, 14	XII, 14	XII, 13	XII, 14	XII, 14
Anal	III, 13	III, 13	III, 14	III, 13	III, 13	III, 13
Pectoral	16	15	16	15	16	16
Ventral	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5
Number of scales in lateral line	61	62	60	60	60	61
Number of transverse rows above lateral line	8	8	8	8	8	8
Number of transverse rows below lateral line	16	16	16	16	16	16

CATALOGUE OF CASTS TAKEN BY CLARK MILLS, ESQ., OF THE HEADS OF SIXTY-FOUR INDIAN PRISONERS OF VARIOUS WESTERN TRIBES, AND HELD AT FORT MARION, SAINT AUGUSTINE, FLA., IN CHARGE OF CAPT. R. H. PRATT, U. S. A.

The attention of anthropologists in later years has been directed very closely to the shape of the head, of the lineaments, and of the external form generally of mankind during life, instead of being confined to that of the cranium and the skeleton, and every opportunity of securing accurate casts, in plaster, of the native races of a country is eagerly embraced. The face masks made by the brothers Schlagintweit, of Asiatic tribes, are well-known standard objects in the principal ethnological collections of the world and constitute the largest single series yet brought together.

It has always been difficult to obtain face casts of the North American Indians. They manifest a deeply rooted aversion to the process required, and, indeed, a superstitious fear generally of being imitated in any manner, even by the pencil or camera. The face masks from nature now in existence have, for the most part, been taken from the dead, with the consequent lack of vital expression, and the opportunity of obtaining life-like similitudes of 64 Indian prisoners of war, of at least six different tribes, was promptly embraced by the Smithsonian Institution. No difficulty was experienced in securing these casts, as the Indians had every confidence in the statements of Captain Pratt, who had them in command, that there would be nothing detrimental to either soul or body in the process, and, indeed, he himself was first subjected to it to reassure them. In fact, understanding that the casts were destined for the city of the Great Father at Washington, there to be preserved forever, one invalid whose treatment was deferred until the last could scarcely be satisfied even with the assurance that he should not be neglected.—S. F. BAIRD.

Letter from Captain Pratt.

FORT MARION, ST. AUGUSTINE, FLA.,
February 9, 1878.

Prof. SPENCER F. BAIRD,

Smithsonian Institution, Washington, D. C.:

DEAR SIR: In reply to yours of the 23d of January, I am authorized to forward the categorical list and offenses of the prisoners, compiled from the official reports of the officers having the matter of looking up offenders in charge at Indian agencies. I have added to that list the date and place of arrest or capture, and the date of death of those who have died. To give the other information asked, I add in general some account of our later dealings with these people. This you can abridge or rearrange to your purpose.

Down to less than thirty years ago these tribes roamed without hindrance from the Platte River to the Gulf of Mexico, ranging through

New Mexico, Eastern Colorado, the western parts of Kansas, the Indian Territory, and Texas, having little care or oversight from the government. From time to time their limits were decreased, until, in 1867, they had been given fixed reservations in the Indian Territory; the Cheyennes and Arapahoes west of the Cherokees and north of the Washita River, with hunting privileges in Western Kansas, while the Kiowas and Comanches were south of them and west of the Chickasaws, with privileges to hunt in Northwestern Texas. The opposition to abridgment of their ancient freedom required an active military force to get them within these limits. At the end of 1868, after several engagements and continued unrest from pursuit of troops, they were brought directly under care of their agents upon their reservations. The period of quiet was short. They soon commenced raiding along the frontier, more particularly on those parts they had thought their own. The few cases of punishment received in these forays from the troops or outraged border settlers were only sufficient to give them a relish. Buffalo hunters invaded their territory and angered them by a wholesale destruction of the best resource of their nomadic life. Individual Indians were not held accountable for notorious offenses, and their reservations grew to be places of refuge, from which they raided and to which they fled in comparative protection. Moving in small parties they enforced terror far into the settlements and wreaked vengeance upon the weak and isolated, not sparing women and children, whom they sometimes carried captives to their camps. This was their war, and recitals of adventure on these incursions formed a staple interest in their ceremonies and around their camp-fires. Stealing horses, mules, and cattle from settlements near was largely indulged in. This stock, if not desired for home use, found purchasers on another border or within their own limits. Sometimes the thieves were traced out and called upon to return the stock, but oftener it was clear gain. In this business they had strong competitors and much encouragement by contact and example from the bad white men who leech upon the sparsely settled districts of the frontier. The worthy settler suffered many losses from these men, who, often personating the red man, organized a system of depredations of incredible magnitude, and succeeded in attaching much additional blame on the Indians. Throughout 1870, '71, '72, and '73, things went on from bad to worse. Texas furnished their richest field, but all settlements bordering their reservations suffered; so that in these years scarcely a neighborhood but could tell of some murders or depredations. Surveying parties, emigrants, the lone settler, wagon-trains with supplies for the military, their own consumption, or traders' use, all fell under their lawlessness and barbarous rapine. The counsels and urgings of their agents and other authorities were flung to the winds.

Early in 1874 it was determined to end by force what other measures were clearly unable to stay. To this end, a day was fixed, about mid-

summer, on which all Indians of these tribes who wished to be at peace were to come to their agencies, submit to an enrollment, such roll-calls and other oversight as might be established to hinder their absence. Those who remained out after this date were to be declared hostile and forfeit whatever rights and privileges, heretofore enjoyed, the government might determine to remove. This intention was fully published, but many were incredulous, and when the day arrived, about half each of the Kiowas and Comanches, with a greater proportion of the Cheyennes and a few Arapahoes, had accepted hostilities. They found their error when commands from Kansas, Texas, New Mexico, and the Indian Territory moved upon them simultaneously, and throughout the fall of 1874 and the subsequent winter followed them to their supposed safe retreats on the Staked Plains, or in the canyons of Red River. By spring all of the tribes named, except a few score of Quabada Comanches, were driven in about their agencies. Many were captured in the open field and sent in, while others, evading the troops, threw themselves upon the mercy of the government by surrender to the military authorities at the agencies. As fast as they were taken, or surrendered, all horses, mules, and war material were taken from them, and the warriors confined or paroled within close limits. All against whom good evidence of having committed crime could be found were taken out, and charges were alleged with a view to legal action. Another class, composed of those who were notoriously guilty of crime, but against whom no good evidence could be brought, and also of those who were notoriously insubordinate and stirrers up of bad feeling, was selected to be sent east for confinement in some fort. Not many of the first class could be found, because of difficulties in identifying, as usually, in Indian murders, none live to tell the tale, and Indian testimony is not accepted. When the time came to send them east, for some reason the first class accompanied the second, and all were sent here, where they arrived on the 21st of May, 1875.

In looking up these cases, it was found difficult to strike amiss among so many offenders. Those who accepted the position of friendship to the government by remaining at their agencies, averaged little better than the hostiles, their opposition and offenses, generally, simply antedating those of the hostiles.

Personal history sufficient for your purpose will probably be found in the list, but the charges are only alleged and not proven.

It is simply just to say that since being here these men have set an example to civilization in good behavior; twenty-two of them have learned to read and write, understandingly; while in the matter of labor, at such as could be given, they have not failed or weakened in the slightest degree.

Respectfully and sincerely yours,

R. H. PRATT,
U. S. Army.

LIST OF INDIANS.

Number.	Museum num-ber.	Names.		Tribe.	Rank.	Age.	Weight.		Height.	
		Indian.	English.				Pounds.	Ounces.	Feet.	Inches.
1	30676	Mo-e-yau-boy-ist	Heap of Birds.	Chelyueno.	Chief	49	177	---	6	7
2	30677	Nock-o-yo-nih	Bear Shield	do	do	45	140	---	5	11
3	30678	Min-i-mic	Eagle's Head	do	do	50	135	---	5	11
4	30679	Mi hui yau-i-mup	Medicine Water	do	Leader	40	139	---	6	7
5	30680	Chae-yun-nuh	Long Back	do	Sub-chief	53	184	---	6	11
6	30681	Ow-n-sait	White Man	do	Warrior	54	174	---	6	11
7	30682	O-to-as-tuh-bos	Rising Bull	do	do	30	133	---	5	5
8	30683	Coches	Broken Leg	do	do	24	131	---	5	5
9	30684	Nock-kocist	Bear's Heart	do	do	26	136	---	5	5
10	30685	Hu-i-toich	Star	do	do	162	162	---	5	9
11	30686	Hu-mu-ni-to	Howling Wolf	do	do	27	161	---	5	9
12	30687	O-kut-ha-tuh	Making Medicine	do	do	33	145	---	6	10
13	30688	Wut-ah	Antelope	do	do	39	152	---	6	10
14	30689	Came-ah-sa-rah	Wolf's Marrow	do	do	44	137	---	6	10
15	30690	Ma-ja-ih-ba-chit	Little Medicine	do	do	35	148	---	5	9
16	30691	O-nk-str-nih	Slave Head	do	Chief	23	124	---	5	9
17	30692	Wo-uh-hun-nih	Roman Nose	do	Warrior	22	154	---	5	9
18	30693	Pa-e-yis	Big Nose	do	do	22	135	---	5	9
19	30694	Queh-ke-i-mus	Squint Eyes	do	do	23	135	---	5	9
20	30695	Ko-we-o-narro	Little Chief	do	do	20	134	---	5	9
21	30696	Chis-i-se-duh	Marches	do	do	21	141	---	5	9
22	30697	O-e-wo-toh	Buffalo Meat	do	do	21	136	---	5	9
23	30698	Moh-be-wih-kio	Buzzard	do	do	30	152	---	6	10
24	30699	O-nh-o	Soaring Eagle	do	do	22	172	---	5	9
25	30700	No-co-mis-ta	Bear Killer	do	do	26	128	---	5	9
26	30701	No-mohst	Left Hand	do	do	33	148	---	5	9
27	30702	Noh-hu-nah-wih	Chief Killer	do	do	32	141	---	5	9
28	30703	Nu-nae-ti-yuh	Buffalo Calf	do	do	28	131	---	5	9
29	30704	Nu-nae-ti-yuh	Packer	do	Squaw	34	138	---	5	9
30	30705	Huh-nah-nah-co-ah	White Bear	do	Warrior	26	143	---	5	9
31	30706	Huh-nah-nah-co-ah	Choctaw	do	Prominent man	25	126	---	5	9
32	30707	Isa tah	White Horse	Caddo	Chief	49	160	---	5	9
33	30708	Wo-haw	Beef	Kiowa	Warrior	30	197	---	5	9
34	30709	Ta-na-ti	Bad Eye	do	Leader	23	133	---	5	9
35	30710	So-gau-se	Double Vision	do	Chief	62	160	---	5	9
36	30711	Se-a-mi-a-da	Bear in the Clouds	do	Leader	48	159	---	5	9
37	30712	E-si-sim-ers	Lone Wolf	do	Chief	55	162	---	5	9
38	30713	Zo-ton	Biter	do	Warrior	24	175	---	5	9
39	30714	On-ko-elt	Ankle	Mexican	do	23	131	---	5	9

40	30715	Obet-toint	High Fore-head	do	do	151	8	5	9
41	30716	E-ta-dle-uh	Boy	do	do	21	166	5	10
42	30717	Zu-pe-he	Toothless	Mexican (captured by Kiowas at 18)	do	45	133	5	1 $\frac{1}{2}$
43	30718	Tsal-dle-tah	White Goose	Kiowa	do	30	156	5	10
44	30719	Zone-ke-uh	Teeth	do	do	20	150	5	7
45	30720	Beah-ko	Old Man	Mexican (Kiowa captive at 6)	do	38	151	5	5 $\frac{1}{2}$
46	30721	To-na-ko-uh	Good Talk	Kiowa	do	19	145	5	6 $\frac{1}{2}$
47	30722	Ko-ba	Wild Horse	do	do	29	153	5	7 $\frac{1}{2}$
48	30723	Mau-ko-poh	Flat Nose	do	do	21	149	5	7 $\frac{1}{2}$
49	30724	Au-luh	Wise	do	do	28	169	5	10 $\frac{1}{2}$
50	30725	Ko-do	Club Foot	Mexican (Kiowa captive at 5)	do	27	156	5	9 $\frac{1}{2}$
51	30726	To-o-sape	Buffalo With Hole in its Ear	Mexican (Kiowa captive at 8)	do	45	132	5	2 $\frac{1}{2}$
52	30727	Tsai-ko-pe-ta	Bear Mountains	Cheyenne father, Pawnee mother; has lived with Kiowas 14 years	do	25	166	5	3 $\frac{1}{2}$
53	30728	Petro	Petro	Mexican (Kiowa captive at 5)	Warrior	48	136	5	5
54	30729	Gno-yo-uh	Pile of Rocks	Comanche	do	46	186	5	.....
55	30730	Pa-roo-rite	Little Prairie Hill	Mexican (Comanche captive)	do	42	133	5	4 $\frac{1}{2}$
56	30731	Eck enah-ats	Red Antelope	do	do	39	137	5	5 $\frac{1}{2}$
57	30732	Wy-a-ko	Dry Wood	do	do	30	140	5	9
58	30733	Pe-ka-do-ah	Black Horse	Mexican father, Comanche mother	do	46	150	5	8
59	30734	Nad-a-with-t	Black Horse	Comanche	Chief	26	145	5	11
60	30735	Ta-a-way-te	Buffalo Scout	do	Warrior	22	160	5	7 $\frac{1}{2}$
61	30736	Pe-ch-ohip	Little Feather	do	do	25	155	5	5 $\frac{1}{2}$
62	30737	Tischa-kah-da	Always Sitting Down in a Bad Place	do	do	31	141	5	5 $\frac{1}{2}$
63	30738	Pe-ab-in	Mother	do	do	31	136	5	3 $\frac{1}{2}$
64	30739	Ah-kes	Small Child	do	Girl	9	64	5	11 $\frac{1}{2}$

The foregoing tabular statement is correct.

R. H. PRATT,
First Lieutenant Tenth Cavalry, in charge of Indian prisoners.

NOTES ON THE PRECEDING LIST.

CHEYENNES.

- 30676 (1) **Heap of Birds.**—*Chief*.
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died October 9, 1877.
Ringleader.
- 30677 (2) **Bear Shield.**—*Chief*.
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Killed Watkins.
- 30678 (3) **Minimic.**—*Chief*.
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30679 (4) **Medicine Water.**—*Warrior*.
Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.
Charge 1st.—Wilful and deliberate murder. Did kill or assist in killing a party of surveyors, white men, consisting of Capt. Oliver F. Short and his son, F. D. Short, James Shaw and his son, J. Allen Shaw, and J. H. Renschler, residents of Lawrence, Kans. Also, Henry C. Jones.
Charge 2d.—Abduction. Illegal detention. Kidnapping. Did carry off or assist in carrying off Catherine, Sophia, Julianne, and Mary Germain, aged, respectively, 18, 13, 7, and 5½ years. Held the first two as captives from September 11, 1874, until March 1, 1875.
- 30680 (5) **Long Back.**—*Subchief*.
Arrested at Cheyenne Agency, Indian Territory, March 18, 1875.
Held and abused Germain girls.
- 30681 (6) **White Man.**—*Warrior*.
Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.
Accomplice in Short and Germain murders; pointed out by Medicine Water.
- 30682 (7) **Rising Bull.**—*Warrior*.
Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.
Accomplice in above murders; pointed out by Germain girls.
- 30683 (8) **Cohoe.**—*Warrior*.
Arrested at Cheyenne Agency, Indian Territory, January 9, 1875.
Accomplice (pointed out by Big Moccasin and Medicine Water) in Germain murder.

- 30684 (9) **Bear's Heart.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Accomplice (pointed out by Big Moccasin and Medicine Water) in Germain murder.
- 30685 (10) **Star.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
No offence charged.
- 30686 (11) **Howling Wolf (Minimic's Son).**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30687 (12) **Making Medicine.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30688 (13) **Antelope.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30689 (14) **Come-uh-see-valh (Wolf's Marrow).**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30690 (15) **Little Medicine.**—*Chief.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30691 (16) **Shave Head.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30692 (17) **Roman Nose.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30693 (18) **Big Nose.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30694 (19) **Squint Eyes.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.
- 30695 (20) **Little Chief.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30696 (21) Matches.—Warrior.

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30697 (22) Buffalo Meat.—Warrior.

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30698 (23) Buzzard.—Warrior.

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30699 (24) Soaring Eagle.—Warrior.

Arrested at Fort Wallace, Kansas, December 25, 1874.

Brown murder, near Wallace. Had Brown's pistol when captured by Lieutenant Hinkle.

30700 (25) Moconista.—Warrior.

Arrested at Fort Wallace, Kansas, December, 25, 1874.

Brown murder.

30701 (26) Left Hand.—Warrior.

Arrested at Fort Wallace, Kansas, December 25, 1874.

Brown murder.

30702 (27) Chief Killer.—Warrior.

Arrested at Staked Plains, Texas, September 24, 1874.

Participated in the killing of the Germain parents and son and daughter, and in the carrying away into captivity of the four sisters.

30703 (28) Mochi.—Squaw.

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Put an axe in head of Germain girls' father.

Grey Beard.—Chief.

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Jumped from the train *en route*, near Houston, Fla., May 21, 1875, and was shot by the guard and died in two hours.

Ringleader.

Big Moccasin.—Warrior.

Arrested at Cheyenne Agency, Indian Territory, December 14, 1874. Died November 4, 1875.

Captured by Captain Keys, and pointed out by Medicine Water.

Ringleader and murder.

Lean Bear.—Chief.

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died July 24, 1875.

Ringleader.

Shaving Wolf.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died December 5, 1876.

Ringleader.

Spotted Elk.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died January 2, 1877.

Ringleader.

ARAPAHOES.

30704 (29) Packer.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Charge.—Wilful murder. Killed Leon Williams, a Mexican herder in the employment of the United States Government, at Arapahoe and Cheyenne Agency.

30705 (30) White Bear.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Attempt to kill. Did shoot at, with intent to kill, F. H. Williams, an employé of the United States Government, at the Arapahoe and Cheyenne Agency.

KIOWAS.

Woman's Heart.—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874. Released by order of the Secretary of War, April 18, 1877.

Participated in the assaults on Amos Chapman and party, and on Major Syman's train, near the source of the Washita River, Texas, September 9 to 13, 1874. Participated in the murder of Jacob Dilsey, on the North Fork of the Canadian River, below Camp Supply, near Cottonwood Grove, Indian Territory, November 21, 1873.

CADDOES.

30706 (31) Huh-nah-nee.—*Prominent Man.*

Arrested at Fort Sill, Indian Territory, April 7, 1875.

Killed E. P. Osborne (Black Beaver's son-in-law) near the Wichita Agency, Indian Territory, August 22, 1874.

30707 (32) White Horse.—*Chief.*

Arrested at Fort Sill, Indian Territory, 17th December, 1874.

Led the party killing Manuel Ortego and Lucien Munós, near Dr. J. J. Sturms, on the Little Washita River, Indian Territory, August 22, 1874. Participated in the Howard's Wells Texas massacre, 1872. Led the party killing the Lee family and abducting the Lee children, near Fort Griffin,

Texas, 1872. Led the party killing Mr. Koozier, near Henrietta, Texas, and carrying his wife and four children in captivity, 1870. Led the party attacking the mail stage, dangerously wounding the driver, robbing the stage, killing, wounding, and robbing the stage of its mules, near Johnson's Station, 25 miles west of Fort Concho, Texas, July 14, 1872. Notoriously a murderer and raider.

- 30708 (33) **Wo haw (Beef).**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Participated in the murder of Manuel Ortego and Lucien Munos. Was in the party killing Jacob Dilsey.

- 30709 (34) **Bird Chief, alias Bird Medicine, alias Bad Eye.**—*Warrior and Leader.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Participated in the assaults on Amos Chapman and party, and Major Syman's train near the source of the Washita River, Texas, September 9 to 13, 1874. Led the party, killing Jacob Dilsey on the North Fork of the Canadian River, below Camp Supply, near Cottonwood Grove, Indian Territory, November 21, 1873. Was in the party killing J. H. Martin, Mr. Canala, and Mr. Himes near Kiowa or Medicine Lodge Creek, Barbour County, Kansas, June 16, 1874. Participated in the murder of Earnest Modest; seized Modest by the wrist and held him while another shot him, near Wichita Agency, August 22, 1874.

- 30710 (35) **Double Vision.**—*Petty Chief.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Was in the party murdering Earnest Modest. Held the bridle of Romero's horse all the time the murder of Earnest Modest was being accomplished.

- 30711 (36) **Sa-a-mi-da (Bear in the Clouds).**—*Leader.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Participated in the murder of Earnest Modest. Took care of the horses of the party, while the other Indians hammered Earnest to death with their hatchets.

- 30712 (37) **Lone Wolf.**—*Chief.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Headed a party of Kiowas, killing two buffalo-hunters, Dudley and Wallace, on the Canadian River, below Adobe Walls, early in 1874; led a party of 100 Indians, more or less, in assailing a party of non-combatants, citizens of the United States, viz, E. P. Osborne, E. H. Barrett, Jackson Clark, and Charles Losson, and did murder, or aid in, assist,

and abet the murder, with firearms of three of the aforesaid non-combatants, viz, Osborne, Barrett, and Clark.

- 30713 (38) **Zo-tom (Biter).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was in party headed by Mah-mante, killing two colored men on Salt Creek Prairie, between Jackson and Belknap, Texas, 1870 or 1871. Participated in the attack on buffalo-hunters at Adobe Walls, early in spring of 1871.

- 30714 (39) **On-ko-elt (Ankle).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Bad man; was with Mah-mante, killing two colored men, &c.

- 30715 (40) **Ohet-toint (High Forehead).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Mah-mante when he killed the man in the wagon; was with Lone Wolf killing two buffalo hunters.

- 30716 (41) **E-tah-dle-uh (Boy).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf killing buffalo-hunters (Dudley and Wallace); was in the party attacking buffalo-hunters at Adobe Walls, early in spring of 1874.

- 30717 (42) **Zo-pe-he (Toothless).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Participated in the killing of two colored men. Went to Texas with a party of Comanches and participated in the killing of two men on the Clear Fork of the Brazos in the summer of 1873.

- 30718 (43) **Tsah-dle-tah (White Goose).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf, killing two men, buffalo-hunters, Wallace and Dudley; was prominent in the attack on troops at the Washita, August 22, 1874; helped to kill the white men Modest, Osborne, and others.

30719. (44) **Zone-ke-uh (Teeth).**—*Warrior.*

Arrested at Salt Fork, Red River, February 18, 1875.

Was with Mah-mante killing the two colored men. Was with Lone Wolf killing two buffalo-hunters, Dudley and Wallace.

30720. (45) **Beah-ko (Old Man).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Helped rob Shirley's store at the Wichita Agency, Indian Territory, August 22, 1874.

30721. (46) To-un-ke-up (Good Talk).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Stealing in Salt Creek Valley, Texas, late in 1871. Was with Lone Wolf killing Dudley and Wallace, buffalo-hunters.

30722 (47) Ko-ba (Wild Horse).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Mah-mante stealing a lot of mules in the Brazos country in 1872. Participated in the attack on General Davidson's command at Wichita Agency, August 22, 1874.

30723 (48) Mau-ko-peh (Flat Nose).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Stealing horses, and was with Mah-mante stealing a lot of mules in the Brazos country in 1872.

30724 (49) Au-lih (Wise).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf killing Dudley and Wallace. Was with Mah-mante when he killed the man in the wagon. Stealing horses. Helped rob Shirley's store. Participated in the attack on General Davidson's command.

30725 (50) Ko-ho (Kicking).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf killing Dudley and Wallace. Was with Mah-mante killing the two colored men. Helped rob Shirley's store. Participated in the attack on General Davidson's command. Stealing mules.

30726 (51) To-o-sape (Bull with Holes in his Ears).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Mah-mante killing the two colored men. Was with Lone Wolf killing Dudley and Wallace. Stealing mules.

30727 (52) Tsait-kope-ta (Bear Mountain).—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Helped rob Shirley's store. Stole horses. Was with Lone Wolf killing Dudley and Wallace.

30728 (53) Pedro.—Warrior.

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Killed a colored man, known as Frenchy, near the

Wichita Agency, Indian Territory, August 22, 1874. Was in a party killing two white men below Fort Griffin, Texas, in the winter of 1872-73. One of the men was riding a mule, and the other a horse, at the time. Was a prominent character in the party robbing Shirley's store. Stole horses and mules. Was with Mah-mante killing the man in the wagon.

Ih-pa-yah (**Straightening an Arrow**).—*Warrior*.

Arrested at Salt Fork, Red River, February 18, 1875.

Died October 5, 1875.

Stealing horses in or near the Salt Creek Valley, Texas, in the spring of 1873.

Co-a-bote-ta (**Sun**).—*Warrior*.

Arrested at Sulphur Ct. H., Indian Territory, October 23, 1874. Died May 24, 1875. Participated in the murder of Jacob Dilsey.

Ah-ke-ah, *alias* **Pah-o-ka** (**Coming to the Grove**).—*Warrior*.

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874. Released by order of Secretary of War, April 18, 1877.

Participated in the murder of Jacob Dilsey.

Mah-mante, *alias* **Swan** (**Man who Walks above the Ground**).—*Chief*.

Arrested at Salt Fork, Red River, Indian Territory, February 13, 1875. Died July 29, 1875.

Led a party, killing two colored men, on the Salt Creek Prairie, between Jacksboro' and Belknap, Texas, 1870 or 1871. Killed a man on the road south of Fort Griffin, Texas, some time in 1870. Two men were riding in a lone wagon, Mah-mante lay concealed and shot one. Led a party stealing a large lot of mules in the Brazos country in 1871. One mule was spotted. Killed a white woman and child in revenge for the loss of two of his men, while on a raid in South-western Texas, in fall of 1874. Was with Lone Wolf, killing two buffalo-hunters, Dudley and Wallace, &c.

COMANCHES.

30731 (56) Eck-e-mah-ats (**Buck Antelope**).—*Warrior*.

Arrested at Elk Creek, Indian Territory, October 26, 1874.

Was in Texas with a party and stole horses about December, 1873.

30732 (57) Wy-a-ko (**Dry Wood**).—*Warrior*.

Arrested at Elk Creek, Indian Territory, October 26, 1874.

Has been in Texas stealing horses; was in Texas last in the winter of 1873-74.

30733 (58) Black Horse.—*Chief.*

Arrested at Fort Sill, Indian Territory, March 7, 1875.

Talked defiantly in council with Governor Davis at Fort Sill, Indian Territory, 1873. Killed a white man near Fort Cobb, Indian Territory, 1867. The man went in his company on a hunt, and it was thought at the time that Black Horse procured him to go for the purpose of killing him. That the Indian Agent Leavenworth and an inn-keeper named Lewis had engaged him to do the job on account of some trouble they had had with the man, who was a bad character.

30734 (59) Mad-a-with-t.—*Warrior.*

Arrested at Fort Sill, Indian Territory, March 7, 1875.
Died July 21, 1877.

A raider. A bad man. Always trying to persuade young men to go off into Texas, always going himself.

30735 (60) Ta-a-way-ite (Telling Something).—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 18, 1875.

A raider. A bad man. Always stealing horses or on a war-path. Never brings his horses to Sill. Steals them, and takes them to the Quahada Camp on the Staked Plains.

30736 (61) Pe-eh-chip (Tail Feathers).—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 18, 1875.

He is one of the five fellows that shot their father and was outlawed; that Captain Lee (Tenth Cavalry) was sent down to Double Mountain after, in the fall of 1873. He has been on the war-path ever since.

30737 (62) Tis-cha-kah-da (Always Sitting Down in a Bad Place).—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 18, 1875.

A bad man. Always off trying to steal horses, or on the war-path, &c. He is one of the desperadoes Captain Lee (Tenth Cavalry) was sent down to Double Mountain after late in 1873.

Quoi-yo-uh.—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 8, 1875.

Bad man. Stealing horses. Stole thirty or more horses from the Chickasaws.

Pa-voor-ite (Little Prairie Hill).—*Warrior.*

Arrested at Wichita Agency, Indian Territory, December 25, 1874.

Helped steal forty-six horses from near Fort Sill belonging to K[iowa?] and C[omanche?] Agency and John Madden, citizen, May 11, 1874. Threatened to kill Mr. Clark, Comanches inn-keeper, on the day of the Wichita disturbance, August 22, 1874. Drew pistol on Clark.

**SYNOPSIS OF THE PEDICULATE FISHES OF THE EASTERN COAST OF
EXTRATROPICAL NORTH AMERICA.**

By THEODORE GILL.

The present sketch of the North American Pediculate Fishes is extracted from a general work on the fishes of the corresponding region, which it is proposed to publish in instalments and as convenience may dictate. The issue of that relative to the Pediculates seems to be at least as much called for as any other on account of the recent additions to our knowledge of the group and the rarity of the volumes in which those additions have been recorded. The recent discovery, too, of so many northern and deep-sea forms not far from our eastern coast renders it possible that any of the types herein enumerated may be found in the same waters, and the present synopsis may lead to their ready identification. The knowledge of the northern forms is chiefly due to Dr. Lütken.

Synopsis of Families.

- 1a. Branchial apertures in or behind the inferior axillæ of the pectoral fins; anterior dorsal ray superior; mouth more or less opening upwards; the lower jaw generally projecting beyond or closing in front of upper.
- 2a. Pseudobranchia with three actinosts; pseudobranchiæ not developed.
 - 3a. Pectoral members geniculated, with elongated pseudobranchia; ventral fins developed ANTENNARIIDÆ.
 - 3b. Pectoral members not geniculated, with moderate pseudobranchia; ventral fins suppressed CERATHIDÆ.
- 2b. Pseudobranchia with two actinosts; pseudobranchiæ developed.
 - 3. Pectoral members little geniculated, but with elongated pseudobranchia; ventral fins separated by wide interval LOPHIIDÆ.
- 1b. Branchial apertures in the superior axillæ of the pectoral fins; anterior dorsal ray in a cavity overhung by the anterior margin of the forehead; mouth subterminal or inferior, the lower jaw being generally received within the upper MALTHERIDÆ.

ANTENNARIIDÆ.

Pediculates with elongated geniculate pseudobranchia, provided with three actinosts, *i. e.*,

Pediculates with a compressed body; the mouth opening upwards; the branchial apertures perforated in the lower axils of the pectorals; no pseudobranchiæ; the dorsals represented by (1) at least a frontal or superior rostral spine, and (2) an oblong soft dorsal; the pectoral members distinctly geniculated, with elongated pseudobranchia and three actinosts; and with well developed and approximated ventrals.

ANTENNARIINÆ.

Antennariids with the body oval and with tumid abdomen, the head compressed, the mouth quite large; teeth on the palate as well as jaws; spinous dorsal represented by three spines; soft dorsal quite elevated; and pelvic bones elongated.

PTEROPHRYNE.*

Antennariines with skin naked and smooth; caudal peduncle free; mouth oblique; dorsal spines completely exerted; soft dorsal and anal expanded vertically; pectorals and wrists slender, and ventrals elongated.

Pterophryne histrio.

Common Frog-fish. Mouse-fish.

- 1758—*Lophius histrio*, *Linné*, *Systema Naturæ*, 10. ed., p. 237; 12. ed., t. 1, p. 403; Gmel. ed., t. 1, p. 1481.
 1815—*Lophius gibbus*, *Mitchill*, *Trans. Lit. and Phil. Soc. N. Y.*, v. 1, pl. 4, f. 9.
 1837—*Chironectes pictus*, *Cur. & Val.*, *Hist. Nat. des Poissons*, t. 12, p. 393, pl. 363.
 1837—*Chironectes tumidus*, *Cur. & Val.*, *Hist. Nat. des Poissons*, t. 12, p. 397.
 1837—*Chironectes lævigatus*, *Cur. & Val.*, *Hist. Nat. des Poissons*, t. 12, p. 399.
 1837—*Chironectes nesogalicus*, *Cur. & Val.*, *Hist. Nat. des Poissons*, t. 12, p. 401.
 1837—*Chironectes marmoratus*, *Cur. & Val.*, *Hist. Nat. des Poissons*, t. 12, p. 402.
 1839—*Chironectes lævigatus*, *Storer*, *Boston Jour'n. Nat. Hist.*, v. 2, p. 383; *Rep. Ich. and Herp. Mass.*, p. 73.
 1842—*Chironectes lævigatus*, *DeKay*, *Zoology of New York, Fishes*, p. 165, pl. 27, f. 83.
 1842—*Chironectes gibbus*, *DeKay*, *Zoology of New York, Fishes*, p. 164, pl. 24, f. 74.
 1853—*Chironectes lævigatus*, *Storer*, *Mem. Am. Acad. Arts and Sc.*, n. s., v. 5, p. 270; *Hist. Fishes Mass.*, p. 104, pl. 18, f. 3.
 1861—*Antennarius marmoratus*, *Günther*, *Cat. Fishes in Brit. Mus.*, v. 3, p. 185.
 1863—*Pterophryne lævigatus*, *Gill*, *Proc. Acad. Nat. Sc. Phila.*, [v. 15.] p. 90.
 1878—*Pterophryne histrio*, *Gill*, *Proc. U. S. Nat. Mus.*, v. 1, p. 216.

Pterophryne with the skin of head and body, as well as dorsal fins, emitting cutaneous tentacles, which are generally most numerous on the second and third dorsal spines and abdomen; the first dorsal spine short and filamentous with a smaller tip surmounted by a small tag; the color light for the ground, with spotted white dots and marked with blackish brown around the ocular region, with several dark radii diverging from the eyes, and on the fins more or less interrupted blackish bands, five or six obliquely crossing the soft dorsal, three rectangularly crossing the anal, and others on the pectorals, ventrals, and caudal.

An inhabitant of the Sargassum Seas, but occasional straggler to the North American coast.

CERATIIDÆ.

Pediculates non-pedicate and deprived of ventral fins, *i. e.*,

Pediculates diversiform in shape, with the mouth opening more or less upwards; the branchial apertures in the lower axils of the pectorals; no pseudobranchiæ; the dorsals represented by at least a frontal or superior rostral spine, the pectoral members not geniculated, with short pseudobranchia and three actinosts, and without ventrals.

Apparently inhabitants of the depths of the ocean in their adult condition, and, in some cases at least, near the surface in their juvenile state. All the known species are unicolored and blackish.

* *Pterophryne*, πτερον, wing, quasi fin, and φρυνη, toad. If considered to be too near *Pterophrynus*, the genus may be called *Pterophrynoides* (φρυνοειδης, toad-like).

Synopsis.

- 1a. Mouth moderate; cephalic spine with its basal element exerted and continuous with the distal; pyloric cœca developed (2).
 2a. A second dorsal spine typically developed; mouth with the cleft subvertical; 1st D. with few rays; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; skin with scattered spinigerous scutellæ CERATINÆ.
Ceratias.
- 1a. Mouth moderate; cephalic spine with its basal element subcutaneous, procumbent, and at right or acute angle with the distal; pyloric cœca none.
 2a. A second dorsal spine developed; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; body naked.
 3. Body and head compressed; mouth with the cleft nearly horizontal, and mandibular articulation behind eye ONEIRODINÆ.
Oneirodes.
2. No second dorsal spine developed; branchiæ in $1\frac{1}{2}2\frac{1}{2}$ pairs; branchial arches armed with dentigerous tubercles; body with scattered tubercular scutellæ.
 3. Body and head compressed; mouth with the cleft oblique; mandibular articulation under or behind eye HIMANTOLOPHINÆ.
 4a. Body oblong oval; dorsal fin with about 9 rays, and pectoral with about 12? *Himantolophus.*
 4b. Body short oval; dorsal fin with 4 rays, and pectoral with about 17 *Corynolophus.*

CERATINÆ.

Ceratiids with the body and head compressed; mouth with moderate and almost or quite *vertical* cleft; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; spinous dorsal represented by a rostral spine, as well as, generally, by a second, whose *basal element* is *exserted*; soft with few rays, placed quite far back of the head; pyloric cœca developed (2).

CERATIAS.*

Ceratiines with an oblong form; skin prickly; vomer toothless; cephalic spine elongated and with a simple capitate extremity; second dorsal spine well developed, and pectorals multiradiate (*i. e.*, with about 20 rays).

Ceratias Holböllii.

- 1844—*Ceratias Holböllii Kroyer*, Naturhist. Tidsskrift, 2. række, b. i, pp. 639-649.
 1861—*Ceratias Holböllii Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 205.

Ceratias with cephalic spine reclining beyond base of caudal fin, and caudal fin longer than body exclusive of head.

Deep sea along Greenland (known from several specimens).

ONEIRODINÆ.

Ceratiids with the body and head compressed; mouth with moderate and almost *horizontal* cleft; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; spinous dorsal represented by a (1) rostral spine, whose basal

* *Ceratias, κεράτιας*, ov. ῥ, one that has horns, in allusion to the frontal ray.

element is procumbent and subcutaneous, and (2) *a second spine, about intermediate between the first and the dorsal fin*; soft dorsal with about 4 rays; and without pyloric cæca.

ONEIRODES.*

Oneirodinæ with oval form; the skin naked; the vomer dentigerous; and the cephalic spine with a bulbous termination, surmounted by slender filaments in several transverse rows.

Oneirodes Eschrichtii.

1871—Oneirodes Eschrichtii Lütken, Overs. over Dansk. Vidensk. Selsk. Forhandl., 1871, pp. 57-74; res. fr., pp. 9-18, pl. 2.

Oneirodes with the terminal element of the cephalic spine rather longer than the proximal subcutaneous; the caudal shorter than the distance between its base and the branchial apertures; and the color black except the terminal half of the spinal bulb, which is whitish.

Deep sea off Greenland: known from a single specimen 205 millimetres long.

HIMANTOLOPHINÆ.

Ceratiids with the body and head compressed, with moderate oblique cleft mouth, the mandibular articulation under the eyes; branchiæ in $2\frac{1}{2}$ pairs; branchial arches armed with dentigerous tubercles; spinous dorsal represented *only by a rostral spine*, whose basal element is procumbent and subcutaneous; and soft dorsal with about 5-9 rays.

HIMANTOLOPHUS.†

Himantolophines of an oblong oval form, a dorsal of about 9 rays, and pectorals with about 12 rays each (?).

Himantolophus Grœnlandicus.

1837—Himantolophus Grœnlandicus Reinhardt, Danske Vidensk. Selsk. Nat. og Math. Aft., 4. række, b. 7, p. 74.

Himantolophus with the height of the body equal to two-fifths of the length, and the frontal ray provided with 11 tentacles (Lütken).

Habitat.—Sea off Greenland (known only from the remains of a specimen 23 inches long).

CORYNOLOPHUS.‡

Himantolophines of an abbreviated oval form, a dorsal of about 5 rays, and pectorals with about 17 rays each.

**Oncirodes*, ὄνειρος, dream-like, in allusion to the small and almost covered eyes.

†*Himantolophus*, ἱμᾶς, ἄντρος, a thong, and λοφος, a tuft.

‡*Corynolophus*, κορυνή, ἡς, "a stick with a knob at the end", or club, and λοφος, a tuft.

Corynolophus Reinhardti.

1878—*Corynolophus Reinhardti*, *Lütken*, K. Dansk. Vidensk. Selsk. Skr., Nat. og Math. Aft., 5. række, b. 5, p. 321, etc.

Corynolophus with the height of the body equal to three-fourths of the total length, and the frontal ray furnished with 8 tentacles.

Habitat.—Sea off Greenland (described from a specimen 14 inches long).

LOPHIIDÆ.

Pediculates with pseudobranchiæ, *i. e.*,

Pediculates with the body differentiated into a wide depressed head and contracted conical trunk; the mouth opening forwards and upwards; the branchial apertures in the inferior axils of the pectoral members; pseudobranchiæ; the spinous dorsal represented by a group of independent cephalic spines (3) and a small postcephalic finlet (with 3 spines); the pectoral members scarcely geniculated, but with elongated pseudobranchia, and with *three* actinosts; and with ventrals well developed.

LOPHIUS.*

Lophiids with vomerine teeth.

Lophius piscatorius.

Bellows-fish.

1758—*Lophius piscatorius*, *Linnæus*, Syst. Nat., 10 ed., t. 1, p. 236 (12 ed., t. 1, p. 402, Gml. ed., t. 1, p. 1479).

1815—*Lophius foliatus*, *Mitchill*, Trans. Lit. and Phil. Soc. N. Y., v. 1, p. 467.

1815—*Lophius piscator*, *Mitchill*, Trans. Lit. and Phil. Soc. N. Y., v. 1, p. 467.

1837—*Lophius piscatorius*, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 344, pl. 362.

1837—*Lophius americanus*, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 381.

1839—*Lophius piscatorius*, *Storer*, Boston Journ. Nat. Hist., v. 2, p. 320; Rep. Ich. and Herp. Mass., pp. 71, 404.

1842—*Lophius americanus*, *DeKay*, Zoology of New York, Fishes, p. 162, pl. 28, f. 87.

1853—*Lophius americanus*, *Storer*, Mem. Am. Acad. Arts and Sc., n. s., v. 5, p. 267; Hist. Fishes Mass., p. 101, pl. 18, f. 2.

1861—*Lophius piscatorius*, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 179.

1861—*Lophius americanus*, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 181 (d. s.).

1872—*Lophius piscatorius*, *Lyman*, 6th Ann. Rep., Int. Fish., p. 44 (Waquoit Weir).

Lophius with a tridentate humeral spine, 11–12 rays in the dorsal fin, and the mouth behind the hyoid bone immaculate.

Habitat.—Coast waters from Newfoundland to North Carolina.

MALTHEIIDÆ.

Pediculates with the branchial apertures in the superior axils of the pectorals, *i. e.*,

Pediculates with a depressed body; the mouth subterminal or inferior, and the lower jaw generally received within the upper; the branchial apertures in the superior axils of the pectoral fins; no pseudobranchiæ;

* *Lophius*, the ancient Latin name of the type of the genus.

the spinous dorsal represented by a tentacle in a cavity overhung by the forehead, and the soft small and far behind; the pectoral members strongly geniculate, and with long pseudobranchia and three actinosts; and the ventrals well developed.

Inhabitants of temperate and tropical seas at moderate or great depths.

MALTHEINÆ.

Maltheids with a cordiform cephalic disk and a stout caudal portion, and with the frontal region elevated.

MALTHE.*

Maltheines of unique genus.

Malthe vespertilio.†

1758—*Lophius vespertilio*, *Linné*, Syst. Nat., 10 ed., t. 1, p. 236 (12 ed., t. 1, p. 402; Gmel. ed., t. 1, p. 1480).

1837—*Malthea vespertilio*, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 440.

1837—*Malthea nasuta*, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 452. (In part.)

1837—*Malthæa notata*, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 453. (In part.)

1842—*Malthea nasuta*, *DeKay*, Zoology of New York, Fishes, p. 167. (In part; not figure.)

1842—*Malthea notata*, *DeKay*, Zoology of New York, Fishes, p. 167.

1842—*Malthea vespertilio*, *DeKay*, Zoology of New York, Fishes, p. 167.

1861—*Malthe vespertilio*, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 200.

Malthe with the forehead produced into a more or less elongated sub-conical process, its width greater between the anterior angles of the orbit than between the posterior ones, and the frontal cavity higher than wide.

Newfoundland to West Indies.

Malthe cubifrons.

1836—*Lophius* (*Malthe*) *cubifrons*, *Richardson*, Fauna Bor.-Am., Fishes, p. 103, pl. 96.

1837—*Malthæa nasuta*, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 452. (In part.)

1842—*Malthea nasuta*, *DeKay*, Zoology of New York, Fishes, p. 166, pl. 28, f. 89. (In part, *i. e.* fig., copied from Richardson.)

1861—*Malthe cubifrons*, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 203.

Malthe with the forehead decurved and in front with a button-like tubercle, the width between the anterior angle of the orbit nearly equal

**Malthe*, *μάλθη*, the Greek name of a loose-bodied fish.—“*Μάλθη* signifie de la cire ramollie. On trouve ce nom dans Oppien parmi ceux de plusieurs grands poissons cartilagineux, et l'espèce qui le porte y est désignée comme remarquable par sa mollesse. Suidas, qui la place dans une énumération du même genre, dit qu'elle est difficile à vaincre. Sur ces deux traits Bérton a pensé que la *malthée* était la baudroie, et, bien que son opinion n'ait pas été adoptée, et n'ait peut-être pas dû l'être, M. Cuvier a cru pouvoir s'en prévaloir pour dériver de *μάλθη* le nom de *malthæa*, qu'il a donné à un petit genre démembré de celui des baudroies.”—*Cuv. et Val.*, Hist. Nat. des Poissons, t. 12, p. 438.

† Whatever may be the value of the nominal species introduced by Cuvier and Valenciennes, all those found along the United States coast, recently examined by myself, belong to one species. I think, however, that formerly I saw a second species of the *M. vespertilio* type.

to that between the posterior ones, and the frontal cavity much broader than high.

Until lately, known from a single specimen obtained in Labrador by Audubon, the ornithologist, and now preserved in the British Museum. There is, however, a specimen in the collection of the Smithsonian Institution from St. Augustine, Florida, whence it was sent by Dr. J. M. Laing, U. S. A.

The relations of the North American genera to the other members of the families in question will be exhibited in the subsequent notes.

NOTE ON THE ANTENNARIIDÆ.

By THEODORE GILL.

The relations of the only known North American representative of the family of Antennariids to the other members of the family is exhibited in the following analytical synopsis, which is essentially the same as that published by the author in 1863. In the present synopsis, however, the most generalized forms (or those supposed to be such) are placed first and followed by those successively more aberrant or specialized. The two species hitherto retained under the generic designation *Brachionichthys* are also differentiated as distinct generic types. Dr. Lütken has recently expressed the opinion that *Pterophryne* and *Histiophryne* appear to be congeneric, but they really seem to be not even closely related.

- 1a. Head compressed; the rostral spine or tentacle as well as two other robust spines developed; soft dorsal well developed.
- 2a. Body oblong claviform; mouth comparatively small; palate unarmed; second and third spines approximated and well connected by membrane and forming a fin; pelvic bones short.....BRACHIONICHTHYINÆ.
- 3a. First dorsal spine connected with second, and third with soft dorsal fin by an incised membrane.....*Sympterichthys*.
- 3b. First dorsal spine free from second, and third from soft dorsal fin.
Brachionichthys.
- 2b. Body oval, with tumid abdomen; mouth quite large; palate armed with teeth; second and third spines distant and not at all or scarcely connected; pelvic bones elongated.....ANTENNARIINÆ.
- 3a. First and second dorsal spines disconnected; the first filamentous, with tentacle at end.
- 4a. D. 12, A. 7. Caudal peduncle free; skin smooth or scarcely granular; mouth oblique; wrists and pectorals slender; ventrals elongated; dorsal spines free from membrane; dorsal fin more than half as long as body; anal extended downward.....*Pterophryne*.
- 4b. D. 12, A. 7—8. Caudal peduncle free; skin rough with spines; mouth vertical; wrists and pectorals widened; ventrals short; 3d dorsal spine partly immersed in skin; dorsal fin less than half as long as body; anal oblong.....*Antennarius*.

- 4c. D. 15, A. 8. Caudal peduncle with dorsal and anal attached by membrane; skin smooth; mouth vertical; dorsal spines scarcely exerted from skin *Histiophryne*.
 3b. First and second dorsal spines connected; the first slender, but rigid, and with tentacle at end *Saccarius*.
 1b. Head cuboid; a rostral spine or tentacle only developed; soft dorsal low.

CHAUNACINÆ.

Chaunax.

The references to the original descriptions of these genera, as well as to their typical species and habitats, are indicated in the following enumeration:—

BRACHIONICHTHYINÆ.

SYMPTERICHTHYS.

Sympterichthys, Gill, Proc. U. S. Nat. Mus., v. 1, p. 222, 1878.

Type: *Sympterichthys lævis* = *Lophius lævis* Lac.

Sea near Van Diemen's Land.

BRACHIONICHTHYS.

Brachionichthys, Bleeker, Natuurk. Tijdschr. Nederl. Ind., t. 7, p. 121, 1854.

Type: *Brachionichthys hirsutus* = *Lophius hirsutus* Lac.

Sea near Van Diemen's Land.

ANTENNARIINÆ.

PTEROPHRYNE.

Pterophryne, Gill, Proc. Acad. Nat. Sc. Phila., [v. 15,] p. 90, 1863.

Type: *Pterophryne histrio* = *Lophius histrio* Linn.

Tropicalia and warm streams in floating seaweeds.

ANTENNARIUS.

Antennarius, Commerson, Lacépède, Hist. Nat. des Poissons, t. 1, p. 421, 1798.

Les Chironectes (*Antennarius*), Cuvier, Règne Animal, 1^{re} éd., t. 2, p. 310, 1817.

Chironectes, Cuvier, Mém. Mus. d'Hist. Nat., t. 3, p. 418, 1817 (not Illiger).

Type: *Antennarius chironectes* Comm.

Tropicalia, in coral groves chiefly.

HISTIOPHRYNE.

Histiophryne, Gill, Proc. Acad. Nat. Sc. Phila., [v. 15,] p. 90, 1863.

Type: *Histiophryne Bongainvillii* = *Chironectes Bongainvillii* Cuv. & Val.

Unknown.

SACCARIUS.

Saccarius, Günther, Cat. Fishes in Brit. Mus., v. 3, p. 183, 1861.

Type: *Saccarius lineatus* Gthr.

Sea off New Zealand.

CHAUNACINÆ.

CHAUNAX.

Chaunax, Lowe, Trans. Zool. Soc. London, v. 3, p. 339, 1846-49.

Type: *Chaunax pictus* Lowe.

Atlantic Ocean off the island of Madeira.

ON THE PROPER SPECIFIC NAME OF THE COMMON PELAGIC ANTENNARIID PTEROPHYRNE.

By THEODORE GILL.

The most common and widely distributed of the Antennariids, and which is the peculiar species of the high seas, has been entered in the most recent systematic lists under the names *Antennarius marmoratus** and *Pterophryne picta*.† In this connection, it has been assumed that the species had first received names from Bloch and Schneider in 1801. I propose, however, to show, (1) that the species itself had long before received a name from the founder of the binomial nomenclature, and (2) that neither of the names of Bloch and Schneider is referable to these species. Long ago recognizing that the names of Bloch and Schneider had nothing to do with a *Pterophryne*, but without the bibliographical aids for certainly ascertaining what name had priority, I have hitherto adopted the provisional name *Pterophryne lævigata*, as Lütken has also recently done.

I.

It behooves us, first, to inquire what was the basis of the *Lophius histrio* of Linnæus.

In 1747, in his "Wästgöta resa förrättad år 1746", Linnæus described, as "*Balistes, quæ Guaperra chinensis*", a small fish scarcely exceeding in length the last joint of the thumb, in the following terms, as translated in the German edition of 1765.‡

"*Balistes, quæ Guaperra chinensis. Corpus acutum, compressum. Dorsum antice gibbum. Pectus compressum, pinnis pectoralibus terminatum, prominulum. Latera corporis picta lituris lacteis, annularibus, interruptis, puncto centrali lacteo notatis. Caput magnum, thoraci immersum, dentibus minutissimis instructum. Filamentum subulatum, erectum, loco narium. Pinna dorsalis anterior retrorsum falcato-subulata, mollis, alta, e gibbere dorsi juxta caput enata, radio 1. Pinna dorsalis posterior radiis 12. Pinnæ pectorales brachiorum instar manubris instructæ, et antrorsum manuum instar inflexæ (quod in piscibus singulare), radiis 10. Pinnæ ventrales approximatae, radiis 5. Pinna caudæ radiis 9. Pinna ani radiis 7. Iris oculorum alba. Magnitudo totius piscis vix extimum pollicis articulum superat. Diversissima species a Guaperra Ionstoni T. VI. f. 6. quam ex America possideo. Die Figur dieses Fisches in natürlicher Grösse ist die 5^{te} auf der 3^{ten} Tafel, wo er bey *a* von der Seite, bey *b* aber auf dem Rücken vorgestellet ist, dass die Aërme an den pinnis pectoralibus deutlich in die Augen fallen."*

The acute compressed body, the round milky spots, the small rostral filament (none is represented in the figure), the well developed fins,

* *Antennarius marmoratus*, Günther, Cat. Fishes in Brit Mus., v. 3, p. 185, 1861; Bleeker Atlas Ichthyologique Indes Orient. Néerland., t. 5, p. 23, 1865.

† *Pterophryne picta*, Goode, Bull. U. S. Nat Mus., No. 5, p. 20, 1876.

‡ Linné, Reisen durch Westgothland. 8vo. Halle, 1765. p. 160, S. 138.

the five rays of the ventrals, and the white irides all better suit the common *Pterophryne* than any other Antennariid.

In 1754, in his Catalogue of the Museum of King Adolphus Frederick,* Linnæus again described, under the name "*Lophius tumidus*", evidently the same species, as follows:—

"tumidus. LOPHIUS pinnis dorsalibus tribus.

Balistes quæ Guaperua chinensis. It. W. goth. 137. t. 3. f. 5.

Guaperua. Maregr. bras. 150. Will. icht. 50. t. E. 2. f. 2.

Habitat in Pelago inter Fucus natantes.

Corpus molle instar Ranae, adpersum ramentis cutaceis. Apertura branchiarum ad axillas brachiorum s. pone pinnas pectorales, quæ decurrit ad pulmones; alia apertura nulla, quod indicat affinitatem cum Ranis. Pinnæ in dorso tres: prima radio uno capiti insidet; altera pectori radio uno instructa; tertia dorso radiorum duodecim, quorum duo vel tres bifidi. Pectorales radiis 10, quæ ulnis s. brachiis instructæ. Ventrals radiis 5, hæ ante pectorales basi ad pectus connexæ. Ani radiis 7 bifidis. Caudæ radiis 10 bifidis."

The soft body like that of a frog (and therefore naked and not rough) and the cutaneous filaments are additional characters which corroborate those given in the former work, and certify the relevancy of the descriptions to the common *Pterophryne*. The habitat is also not the least important element in the determination of the Linnæan species, inasmuch as the true *Antennarii*, so far as known, frequent chiefly coral groves, while the *Pterophryne* is a pelagic species, principally affecting the floating sea-weeds. There can then be no reasonable doubt that the Antennariid of Linnæus was the common *Pterophryne*.

In 1758, in the tenth edition of the "Systema Naturæ", Linnæus first introduced, and in 1766, in the twelfth edition, retained, the name "*Lophius histrio*", and in the synonymy of the species included references to the two works just cited. The entire passage relative to the species is as follows, in the twelfth edition (p. 403):—

"histrio. 3. L. compressus.

Chin. Lagerstr. 21. Lophius pinnis dorsalibus tribus.

Mus. Ad. Fr. 1. p. 56. Balistes s. Guaperua chinensis.

It. ægoth. 137. t. 3. f. 5. Balistes s. Guaperua.

Maregr. bras. 150. Guaperua.

Pet. gaz. t. 20. f. 6. Piscis bras. cornutus.

Will. icht. 50. t. E. 2. f. 2. Guaperua.

Osb. iter. 305. Lophius tumidus.

Habitat in Pelago inter Fucum natantem.

Pinnæ D. 1, 1, 12. P. 10. V. 5. A. 7. C. 10."

The reference to Petiver's *Gazophylacium* was added in the twelfth edition.

* Museum S.^æ R.^æ M.^{tis} Adolphi Friderici. Car. Linnæo. Fol. Holmiæ, 1754. p. 56.

Although the descriptions of Linnæus are unequivocal and based solely on specimens of *Pterophryne*, in the synonymy above copied are confused several species. As he seems, however, only to have known through autopsy the species of *Pterophryne*, and to have been unprepared for the polymorphous character of the type, his confusion under the synonymy is not at all to be wondered at, and is paralleled by many modern naturalists, especially Günther. His compatriot, Osbeck, had also the same species of *Pterophryne* in view in his description* of the *Lophius histrio*, viz:—

“Die Flossquabbe, *Lophius Histrio* L. S. N. *Lophius tumidus* Mus. Reg. p. 56, und Linn. Westgoth. Reise Tab. 3, Fig. 3, aber der Faden und die erste Rückenflossfeder sind an den Spitzen borstig, die Borsten weich. Der ganze Körper ist mit einer schleimigen Haut, und kleinen blättrigen Stützen (*fulcris*) bedeckt, die man ausser dem Wasser kaum bemerkt, weil sie fest anschliessen. Der Rachen und Bauch sind gross, damit sie viele Krebsarten oder junge Krebse verschlingen können. Vielleicht hat die Vorsicht diesen Fisch deswegen so blättrig gekleidet, damit ihn die Raubfische mit dem Seegrass verwechseln und nicht gar ausrotten möchten.”

The smooth skin and the tag-like appendages evidently proclaim the fish of Osbeck to be a *Pterophryne*.

It is also to be remarked that the naturalist who first recognized specific differentiation among the Antennariids (Shaw), in his “General Zoology” (v. 5, p. 384, pl. 164), restricted the name to the *Pterophryne*, and gave, under the term *Lophius histrio*, a quite recognizable figure of that form, whose only great fault is the delineation of the first spine.

II.

The names subsequently applied to *Pterophryne* now demand consideration.

Those accepted by the latest systematists have been attributed to Bloch's *Systema Ichthyologiæ*, edited by Schneider, but, as will presently be shown, erroneously.

In the *Systema Ichthyologiæ* (p. 142) only one species of Antennariids is admitted under the name *Lophius histrio*, but four varieties are distinguished under it, viz:—

Var. *a*, “Striated Loph. Shaw Miscell. No. 58”;

Var. *b*, *pictus*;

Var. *c*, *marmoratus*; and

Var. *d*, *ocellatus*.

As no references have been made to previous publications, except in case of var. *a*, it seems to have been generally assumed that the varietal names originated in the work in question. This, however, is not the case.

* Osbeck, Peter. Reise nach Ostindien und China. 8vo. Rostock, 1765. p. 400.

In 1794 (as appears from the dates on the plates), Shaw published a number of his "Naturalists' Miscellany", in which he described three fishes under the generic name *Lophius*. These were designated as—

- (1) *Lophius striatus* (the Striated Lophius), pl. 175;
- (2) *Lophius pictus* (the Variegated Lophius), pl. 176, upper fig.; and
- (3) *Lophius marmoratus* (the Marbled Lophius), pl. 176, lower fig.

The originals of these are evidently the varieties (*a*, *b*, and *c*) of *Lophius histrio* admitted by Bloch and Schneider. It is quite clear that the first two were based on species of typical *Antennarius* (not *Pterophryne*), while the third is incomprehensible, and, if the figure is at all correct, must represent a factitious fish; it most certainly has nothing to do with *Pterophryne*. The other species, however, notwithstanding the bad figures, are readily identifiable.

The *Lophius striatus* (as has recently been recognized by Günther)* is the first name of an *Antennarius* peculiar to the Pacific, and quite distinct from the Caribbean *Antennarius scaber* (= *A. histrio* Gthr.), with which it was at first confounded by Günther.†

The *Lophius pictus* was evidently based on the species or variety of *Antennarius* which was afterwards named *Antennarius phymatodes* by Bleeker, and it agrees very closely, in the distribution of colors, with a specimen figured by that ichthyologist,‡ and would probably be considered by Günther§ as a variety of his *Antennarius Commersonii*.

But whatever may be the value of the forms embraced under the name *Antennarius Commersonii* by Günther,—whether species or varieties,—the name *Antennarius pictus* must be revived from Shaw, either especially for the *Antennarius phymatodes* of Bleeker or for the collection designated as *Antennarius Commersonii*.

It has thus been demonstrated (1) that the Linnæan name *Lophius histrio* was originally created for the common *Pterophryne*, and (2) that the names generally employed for the *Pterophryne* were originally applied to very different forms, and members of even a different genus. Hence, if the laws of priority as formulated by the British and American Associations for the Advancement of Science are to guide us, there can be no question that the species of *Pterophryne* must hereafter be designated as *Pterophryne histrio*; if, however, it is allowable to go behind even the tenth edition of the *Systema Naturæ*, and to take the oldest binomial name, without other considerations, the designation *tumidus* must be revived. It seems best, however, to follow general usage.

*Günther, Andrew Garrett's *Fische der Südsee*, v. 1, p. 162, 1876.

†Günther, *Cat. Fishes in Brit. Mus.*, v. 3, p. 188.

‡Bleeker, *Atlas Ichthyologique des Indes Orientales Néerlandaises*, t. 5, pl. 199, fig. 5, 1865.—It must be remarked that Shaw represents 5 ventral rays in his *A. pictus*, while Bleeker attributes 6 to his *A. phymatodes*.

§Günther, in *Cat. Fishes in Brit. Mus.*, v. 3, p. 195, has referred Shaw's name to "*Antennarius multiocellatus* var. γ . = *leucosoma*", but in the "*Fische der Südsee*" did not refer to the *L. pictus*, and places the *L. marmoratus* as a synonym of *A. Commersonii*, having evidently transposed the names of the two.

NOTE ON THE CERATIIDÆ.

By THEODORE GILL.

Since the publication of the third volume of Günther's "Catalogue of the Fishes in the British Museum" (1861), and the present author's Note on the Pediculati (1863), the then monotypic family of *Ceratiidæ* has received notable additions, and this year (1878) one genus or rather type of hitherto doubtful character has been substantiated, and two new allied ones added. All the representatives of the group appear to be inhabitants of the deep or open seas. The relations of the genera seem to be approximately as follows:—

Synopsis.

- 1a. Mouth moderate; cephalic spine with its basal element exerted and continuous with the distal; pyloric cæca developed (2).
 2. A second dorsal spine typically developed; mouth with the cleft subvertical; 1st D. with few rays; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; skin with scattered spinigerous scutellæ..... CERATIINÆ.
 - 3a. A second dorsal spine developed, and two fleshy tubercles behind it; pectorals with nearly 20 slender rays..... *Cerantias*.
 - 3b. No second dorsal spine developed, but two fleshy claviform tubercles existing in *Cerantias*; pectorals with about 10 slender rays.... *Mancalias*.
- 1b. Mouth moderate; cephalic spine with its basal element subentaneous, procumbent, and at right or acute angle with the distal; pyloric cæca none.
 - 2a. A second dorsal spine developed; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; body naked.
 3. Body and head compressed; mouth with the cleft nearly horizontal, and mandibular articulation behind eye..... ONEIRODINÆ.
Oncirodes.
- 2b. No second dorsal spine developed; branchiæ in $4\frac{1}{2}$ pairs; branchial arches armed with dentigerous tubercles; body with scattered tubercular scutellæ.
 - 3a. Body and head compressed; mouth with the cleft oblique; mandibular articulation under or behind eye..... HIMANTOLOPHINÆ.
 - 4a. Body oblong oval; dorsal fin with about 9 rays and pectoral with about 12?..... *Himantolophus*.
 - 4b. Body short oval; dorsal fin with 4 rays and pectoral with about 17. *Corynolophus*.
- 3b. Body and head depressed; mouth with the cleft vertical or inclined forwards; mandibular articulation under or in advance of snout
EGÆONICHTHYINÆ.
Egæonichthys.
- 1c. Mouth enormous; cephalic spine with its basal element subentaneous, procumbent, and at an acute angle with its distal?).
 2. No second dorsal spine developed. Mouth with the cleft subvertical. 1st D. with about 14 rays; branchiæ in $2\frac{1}{2}$ pairs; branchial arches unarmed; skin naked..... MELANOCETINÆ.
Melanocetus.

CERATIINÆ.

CERATIAS.

Cerantias, Kroyer, Naturhist. Tidsskrift, 2. række, b. 1, p. 639, 1844.

Type: C. Holbølli Kroyer.

Deep sea off Greenland.

MANCALIAS.*

Mancalias, Gill, Proc. U. S. Nat. Mus., v. 1, pp. 227, 228, 1878.

Type: *M. uranoscopus* = *Ceratias uranoscopus*, Murray, *Wyville Thompson, Voyage of the Challenger*, v. 2, p. 67, with fig., 1878. (Am. ed.)

Atlantic Ocean (taken at a depth of 2,400 fathoms), between Canary and Cape Verde Islands.

ONEIRODINÆ.

ONEIRODES.

Oneirodes, Lütken, Overs. over d. K. Danske Vidensk. Selsk. Forhandl., 1871, pp. 56-74 (fr. pp. 9-18).

Type: *O. Eschrichtii* Lütken.

Deep sea off Greenland.

HIMANTOLOPHINÆ.

HIMANTOLOPHUS.

Himantolophus, Reinhardt, K. Danske Vidensk. Selsk. Nat. og Math. Afh., 4. række, v. 7, p. 74, 1837; Lütken, 1878.

Type: *H. Grœnlandicus* Reinhardt.

Deep sea off Greenland (adults).

CORYNOLOPHUS.

Type: *Corynolophus Reinhardtii* = *Himantolophus Reinhardtii* Lütken.

Deep sea off Greenland (adult), and open sea between Africa and America (young)†

ÆGÆONICHTHYINÆ.

ÆGÆONICHTHYS.

Ægæonichthys, T. E. Clarke, Trans. New Zealand Institute, v. 10, p. 245, 1878.

Type: *Æ. Appellii* T. E. Clarke.

Deep sea off the island of New Zealand.

MELANOCETINÆ.

MELANOCETUS.

Melanocetus, Günther, Proc. Zool. Soc. London, 1864, p. 301.

Type: *Melanocetus Johnsonii* Günther.

Deep sea off the island of Madeira.

In the words of Lütken,† “the general form and the physiognomy especially are quite similar in the [known] genera; common to all is, also, the absence of ventral fins, of the lateral line and its ramifications, of the air bladder, of the pseudobranchiæ, and of the teeth of the lower pharyngeal and palatine bones;‡ the smallness of the eyes and of the pectoral

* *Mancalias*, from *mancus*, defective, with a quasi-diminutive termination, to correspond with *Ceratias*. The single specimen obtained was only 90 millimetres long.

† Vidensk. Selsk. Skr., 5. række, Naturv. og Math. Afd., 11te Bd. V, fr. tr., p. 343.

‡ In *Melanocetus*, according to Günther, “the vomer is armed with a transverse series of single teeth, and extends across the whole width of the roof of the mouth; the palatine and pterygoid teeth are situated at some distance behind the vomer, and form two bundles irregular in form”; but, according to Lütken (and since admitted by Günther), “the so-called palatine and pterygoid teeth” “belong in reality to the upper pharyngeals.”

fin, the short peduncles of the latter, the conformation of the teeth, the black color, the number of branchiostegal rays (6) as well as of the rays of the anal (4) and caudal (9), and the half-spongy consistence of the skeleton are also, apparently, characters common to all the [known] genera."

Another character shared in common by all the species, and at least as noteworthy as several of those thus enumerated by Dr Lütken, is the differentiation in the color of the extremity of the bulbiform termination of the cephalic spine. In all the known species (unless *Melanocetus* may be excepted), the apical portion or elements of the bulb are of a grayish or whitish color, and thereby quite abruptly differentiated from the rest of the spine, which is of a black color. Some special significance is probably inherent in this characteristic, and it is quite possible, if not probable, that the difference of color is expressive of a differentiation in histological structure, and that the grayish portions are phosphorescent. When the complicated "angling" apparatus of the fishes of this group is considered, it will be thought not unlikely that their power of attraction should be enhanced by a luminosity which may excite the attention or curiosity of their prey, and still more strongly tempt them within the easy reach of their capacious mouths. It is certainly scarcely likely that the characteristic in question, manifested as it is in such widely diverse types, should be a simple immaterial color feature, destitute of other significance. The not few pelagic and deep-sea animals that exhibit phosphorescence enhance the probability of the attribute suggested. The verity of the suggestion must, however, be established by histological and physiological data. It can only now be assumed that there is a teleological import in the differentiation of color, and that it is more probable that the whitish area has a phosphorescent property than that it simply serves as a relief for the filaments of the bulb. Especially is this more probable in view of the great depths which the species inhabit, and the consequently limited quantity of light which they enjoy. That the provision, whatever it may be, is an effective one, is apparent from the variety of the forms already discovered, and it seems probable that the family is not only quite characteristic of, but well represented in, the depths of the ocean.

As to *Melanocetus*, it is simply said, by Dr. Günther, to have the cephalic filament "more than half as high as the head, and dilated into a small lamella at its extremity". The "lamelliform" character of the dilatation at least requires confirmation, and it is not very unlikely that the dilatation will be found not to be thin or compressed to such an extent as to be entitled to the designation of "lamella", and that the extremity will be ascertained to be whitish. The mode of articulation of the cephalic spine also requires investigation. Dr. Lütken has corrected Dr. Günther's error of mistaking pharyngeal teeth for palatine and pterygoid, but has not elucidated the points indicated.

The several recognized genera are mostly widely differentiated,

and represent as many as five groups, distinguished by characters which are generally indicative of at least family value; but the close agreement which they otherwise exhibit among themselves forbids separation to that extent, and yet the groups seem, at any rate, to demand distinction as sub-families. We would scarcely be prepared to believe that two genera, distinguished, one by a compressed head, and the other by a depressed head, could be so nearly related as are apparently *Himantolophus* and *Ægæonichthys*, but the modifications in question in these genera are probably expressive of the compression on the one hand, and the depression and bowing outwards on the other, at the hyomandibular articulations, and not of any fundamental osteological modifications.

With regard to the Himantolophines, there is occasion for difference of opinion, and it may be that the *Himantolophus Grænlandicus* and *Reinhardtii* do not even differ specifically. The statements by Reinhardt as to the characteristics of the former are, however, unequivocal, and, as he appears to have been a careful and exact observer, they are probably correct, while those of Lütken regarding the latter are unquestionable. In view of the mode of variation in the family, the differences noted seem to the present author to be indicative of more than specific value, and consequently the respective species are considered as distant generic types. There is a singular agreement between the type named *Corynolophus* and the *Ægæonichthys* of the New Zealand seas in the radial formula; and while such agreement might tend to throw doubts on the actual differences supposed to exist between *Corynolophus* and *Himantolophus*, it tends far to confirm the generic value of the differences, if they really exist. It may even be that the two genera are not as closely related as are *Corynolophus* and *Ægæonichthys*, but such is scarcely probable.

The habitats given must be regarded simply as the expressions of our present state of knowledge, as it is more than probable that the ranges of most of the species are quite extensive in the bathmic zone in which they dwell. It is also probable that the number of representatives of the family will be considerably increased hereafter. A most interesting coincidence is the discovery, in the same year, of the closely related *Himantolophinæ* and *Ægæonichthyinæ* at antipodal localities. There are already, too, indications of several other types, apparently members of the family, but too imperfectly known to be introduced into the system. The present state of our knowledge in respect to such imperfectly known forms is well summarized by Dr. Lütken in the following words:—

“Les collections de petits poissons pêchés en haute mer, du Musée de Copenhague, renferment en outre quelques Lophioïdes apodes d’une taille plus petite encore (5—8^{mm}), trouvés en plein Océan Atlantique, qui annoncent peut-être l’existence d’une troisième espèce d’Himantolophe ou d’un genre voisin, et différent de l’*Himantolophus Reinhardtii* par le nombre des rayons (D : 6; A : 6; C : 10), probablement aussi par la

taille moindre des adultes, puisque quelques-uns de ces embryons offrent déjà un rudiment de huppe frontale analogue à celle que possède le jeune Lophioïde, dépourvu non-seulement de ventrales, mais aussi de dorsale et d'anale, indiquant ainsi, selon toute probabilité, l'existence d'un type générique nouveau, que l'on ne tardera point à découvrir à l'état adulte, à mesure que l'étude justement commencée de la faune abyssale de l'océan aura fait de nouveaux progrès. Peut-être aussi que le "*Ceratias uranoscopus*" annoncé comme dragué par l'expédition si fameuse du "Challenger" à la profondeur surprenante de 2400 brasses, entre les îles Canaries et du Cap Vert, sera reconnu comme formant un genre à part—à en juger par une photographie (reproduite en xylographie dans "The Atlantic" de Sir Ch. Wyville-Thomson, II, p. 69), qui m'a été communiquée avec la plus grande obligeance par feu M. Willemoës-Suhm, dont la mort prématurée a été tant déplorée par ses amis et par ceux de la science.

"On trouvera dans le rapport préliminaire de M. Murray (Proc. Roy. Soc., xxiv, p. 590-94) des renseignements sur les profondeurs des huit localités où ont été dragués, lors du voyage du "Challenger" des Lophioïdes bathyphiles, en partie probablement nouveaux pour la science. Dans son rapport préliminaire sur les draguages exécutés, en 1878, dans les profondeurs du Golfe de Mexique, M. Al. Agassiz fait mention d'un poisson ressemblant à un tétard énorme à tête ronde, gigantesque, cartilagineuse et sans yeux, et de quelques autres à tête allongée et déprimée, aux yeux très petits et à filaments énormes pendant des extrémités des rayons des nageoires pectorales et caudal."

NOTE ON THE MALTHEIDÆ.

By THEODORE GILL.

Since the publication of the great systematic works on fishes, the family of *Maltheidæ* has received a couple of notable additions which furnish a good idea of the range of variation occurring in the group and at the same time fully corroborate the justness of the segregation of its members under two distinct families. The distinctions thus apparent are indicated in the following analysis. All the genera are monotypic except *Malthe*.

MALTHEIDÆ.

- 1a. Body with disk cordiform and caudal portion stout; frontal region elevated, and snout more or less produced or attenuated forwards..... MALTHEINÆ.
Malthe.
- 1b. Body with disk subcircular or expanded backwards and caudal portion slender; frontal region depressed, and snout rounded and obtuse in front.
 HALIEUTINÆ.
- 2a. Palate edentulous; rostral tentacle developed; carpus exerted from common membrane.
- 3a. Disk subtriangular; mouth small; branchiæ reduced to 2 pairs (I, 0; II, 1-1; III, 1-1; IV, 0-0)..... *Dibranchius*.

- 3b. Disk subcircular ; mouth large ; branchiæ in $2\frac{1}{2}$ pairs (I, 0 ; II, 1—1 ; III, 1—1 ; IV, 1—0).....*Halieutæa*.
 2b. Palate dentigerous ; rostral tentacle obsolete ; carpus inclosed in common membrane.
 3. Disk subcircular ; mouth small.....*Halieutichthys*.

The genera have been made known as follows :—

MALTHEINÆ.

MALTHE.

Malthe, *Curier*, Règne Animal, 1^e éd., t. 2, 311, 1817.

Malthea, *Cuvier & Valenciennes*, Hist. Nat. des Poissons, t. 12, p. 438, 1837.

Type: *Malthe vespertilio*.

Atlantic coasts of America from Brazil to Labrador.

HALIEUTÆINÆ.

DIBRANCHUS.

Dibranchus *Peters*, Monatsber. K. Akad. Wissensch. Berlin, 1875, p. 736.

Type: *Dibranchus atlanticus Peters*.

Atlantic Ocean, in deep water, near the coast of Africa.

HALIEUTÆA.

Halieutæa *Cur. & Val.*, Hist. Nat. des Poissons, t. 12, p. 455, 1837.

Astrocanthus *Swainson*, Nat. Hist. and Class. Fishes, etc., v. 2, p. —, 1839.

Type: *Halieutæa stellata Val. & Wahl*.

Pacific Ocean, off China and Japan.

HALIEUTICHTHYS.

Halientichthys, *Poey, Gill*, Proc. Acad. Nat. Sc. Phila., [v. 15,] pp. 89, 90, 1863.

Type: *Halientichthys reticulatus Poey*.

Atlantic Ocean, off the Island of Cuba.

NOVEMBER 9, 1878.

CATALOGUE OF THE BIRDS OF ANTIGUA AND BARBUDA, FROM COLLECTIONS MADE FOR THE SMITHSONIAN INSTITUTION, BY MR. FRED. A. OBER, WITH HIS OBSERVATIONS.

By GEORGE N. LAWRENCE.

These collections were made by Mr. Ober in August and September, 1877. They were left in charge of the United States consul at Antigua, to be forwarded to Washington when an opportunity offered, and were sent soon thereafter ; but from want of a proper notification or some other cause, their arrival was not known, and they were supposed to have gone astray.

In July of this year, they were ascertained to be in a public store in Brooklyn, where they had been since November, 1877.

The only bird sent of special interest is a species of Burrowing Owl from Antigua, which, on investigation, I considered to be undescribed.

The names given by Mr. Ober, with his observations, are inclosed in quotation-marks.

From Antigua.

Fam. TURDIDÆ.

1. *Margarops densirostris* (Vieill.).

"Thrush.

"In the valleys among the southern hills, where are about the only rivulets and trees, we find this bird. It is not common, rather rare, and its song is heard only morning and evening; at this season little more than a call-note. Think it identical with the 'Gros Grive'—Large Thrush—of Dominica. Not yet out of moulting stage; resident."

Fam. SYLVICOLIDÆ.

2. *Siurus nævius* (Bodd.).

"Water Thrush.

"Rare; along a river bed among the hills, very shy; when it would perceive me, it hastily ran along a few rods, and then darted into the thicket, reappearing at some distance up or down the stream."

3. *Siurus motacilla* (Vieill.).

4. *Dendroeca petechia* (Linn.).

"Yellow Bird. Length, $5\frac{1}{4}$; alar extent, 7; wing, $2\frac{5}{8}$.

"Not abundant; inhabits the acacia fields."

5. *Setophaga ruticilla* (Linn.).

"Redstart.

"Rare; seen only in the upper valleys of the southern hills. In perfect plumage and fat; evidently not a migrant. The people told me it was with them all the year."

Fam. VIREONIDÆ.

6. *Vireosylvia calidris* (Linn.).

"Vireo. Iris hazel.

"Found among the poisonous Manchineel trees, near the coast."

Fam. CÆREBIDÆ.

7. *Certhiola dominicana*, Taylor.

"Yellowbreast.

"Abundant, but not in the numbers found in Dominica."

Fam. FRINGILLIDÆ.

8. *Loxigilla noctis* (Linn.).

"Sparrow. Resident."

9. *Phonipara bicolor* (Linn.).

"Grass Bird.

"In large numbers, probably the most abundant species, sharing this honor with the Loggerhead and Sparrow Hawk."

Fam. TYRANNIDÆ.

10. *Tyrannus rostratus*, Sel.

"Loggerhead. Resident.

"Extremely abundant; its cry of piperee, piperee, heard everywhere from morn till night. Old pastures its favorite haunt; but where the 'Cabbage Palm' is found (the *Oreodoya olivacea*) there the Piperee delights to stay, passing half the day perched upon the extreme tip of the terminal apex of the tree, leaving it only to chase and capture some insect flying by, or to sport a while with its mate."

Fam. TROCHILIDÆ.

11. *Eulampis holosericeus* (Linn.).

"Violet-breast Hummer. Rather numerous."

12. *Orthorhynchus exilis* (Gm.).

"Crested Hummer. Very common.

"More in the fields than the gardens; especially likes the Tamarind trees."

Fam CUCULIDÆ.

13. *Coccyzus minor* (Gm.).

"Four o'clock Bird. Sparsely distributed. Resident."

Fam. STRIGIDÆ.

14. *Speotyto amaura*, Lawr.

"Owl. Length, ♂, $8\frac{1}{2}$ in.; alar extent, $21\frac{1}{2}$; wing, $6\frac{3}{4}$.

"Length, ♀, $8\frac{1}{2}$ in.; alar extent, 21; wing, $6\frac{1}{4}$.

"Iris bright yellow. Called here, 'coo coo', from its hoot at night. I considered it for a time as almost mythical, reports concerning its existence were so conflicting. Some described it as a large Bat, others asserted that it was (judging from the size of its eyes) as large as a 'Guinea Bird'; all agreed that it was a night-bird, that it lived in old drains, holes in the cliffs and ruined walls; and that its hoot would strike terror to the stoutest heart.

"Like its congener of Dominica, it has a bad name; and though it may not be called here, as in Dominica, the 'Jumbie Bird' or bird of evil spirits—the name implies more than that—still it has the reputation of being a bad character. The blacks declare that it will not hesitate to tear the eyes out of any individual unfortunate enough to meet it at night. 'Me rudder see de Debbil, any time', is their forcible way of testifying to the powers, supernatural and otherwise, possessed by this poor Owl. Finding it impossible to shoot one, I offered a reward of two shillings for the first Owl brought me, and within three hours had three living birds which the men dug out of a cliff in the Chalk-hills. One that I kept two days gave frequent utterance to a chattering cry, espe-

cially if any one approached, but it did not hoot. It feeds upon lizards and mice, it is said."

Male.—Upper plumage of a fine deep brown color, marked with roundish spots of light fulvous; the spots are smallest on the crown, hind neck, and smaller wing coverts; they are conspicuously large on the other wing-coverts, the dorsal region, scapulars, and tertials; the quills are blackish brown, with indented marks of pale reddish fulvous on the outer webs of the primaries, and large roundish paler spots on the inner webs; under wing coverts reddish fulvous sparsely mottled with black; tail dark brown, of the same color as the back, crossed with four bars (including the terminal one), of light reddish fulvous, which do not quite reach the shaft on each web; bristles at the base of the bill black, with the basal portion of their shafts whitish; front white, superciliary streak pale fulvous; cheeks dark brown, the feathers tipped with fulvous; upper part of throat pale whitish buff, the lower part grayish-white, with a buffy tinge, separated by a broad band of dark brown across the middle of the throat, the feathers of which are bordered with light fulvous; the sides of the neck and the upper part and sides of the breast are dark brown, like the back, the feathers ending with fulvous, the spots being larger on the breast; the feathers of the abdomen are pale fulvous, conspicuously barred across their centres with dark brown; on some of the feathers the terminal edgings are of the same color; the flanks are of a clear light fulvous, with bars of a lighter brown; under tail-coverts fulvous, with indistinct bars of brown; thighs clear fulvous, with nearly obsolete narrow dusky bars; the feathers of the tarsi are colored like the thighs and extend to the toes; bill clear light yellow, with the sides of the upper mandible blackish; toes dull yellowish-brown.

Length (fresh), $8\frac{1}{2}$ in.; wing, $6\frac{3}{4}$; tail, $2\frac{1}{8}$; tarsus, $1\frac{1}{2}$.

The female differs but little from the male in plumage; the bars on the abdomen appear to be a little more strongly defined, and at the base of the culmen is a small red spot. There are two females in the collection, the other also having the red spot; in one the tarsi are feathered to the toes, in the other only for two thirds their length.

Length of one (fresh), 8 in.; wing, $6\frac{1}{2}$; tail, $2\frac{7}{8}$; tarsus, $1\frac{1}{2}$.

Length of the other, $8\frac{1}{2}$; wing, $6\frac{1}{4}$; tail, 3; tarsus, $1\frac{1}{2}$.

Mr. Ridgway suggested a comparison with his *S. guadeloupeensis*, the type of which belongs to the Boston Natural History Society, and by the courtesy of Dr. Brewer I have been able to make it.

Compared with *guadeloupeensis*, the prevailing color is dark brown, instead of a rather light earthy-brown, and the spots on the interscapular region are much larger; it is more strikingly barred below, the other having the breast more spotted; the bars on the tail are four instead of six. In the Antigua bird each feather of the breast is crossed with but one bar, while those of the other are crossed with two.

Mr. Ober (who arrived here November 13) informs me that he could learn of no species of Owl inhabiting Guadeloupe, nor does the museum there possess a specimen.

Fam. FALCONIDÆ.

15. *Pandion haliaetus* (Linn.).

"Fish Hawk. Seen September 1st."

16. *Tinnunculus sparverius* var. *antillarum* (Gm.).

"Sparrow Hawk. 'Killee, Killee.'

"In large numbers all over the island. Resident."

17. *Buteo pennsylvanicus* (Wils.)?

"Hawk (seen), resident. Apparently same as the larger hawk of Dominica."

18. *Falco*?

"A large black hawk spoken of as appearing with the flocks of ducks."

Fam. FREGATIDÆ.

19. *Fregata aquila* (Linn.).

"Man o' war Bird.

"Resident. Plentiful in harbor of St. John's."

Fam. PELECANIDÆ.

20. *Pelecanus fuscus* (Linn.).

"Brown Pelican.

"Breeds abundantly on small islands off the coast. Resident."

Fam. ARDEIDÆ.

21. *Garzetta candidissima* (Gm.).

"'White Gaulin.' Resident.

"Everywhere abundant; frequents the dry hills and plains (feeding upon grasshoppers, lizards, &c.) in preference to the pools and moist tracts."

22. *Florida cærulea* (Linn.).

"'Blue Gaulin.' Resident.

"Abundant. Habits same as the preceding."

23. *Butorides virescens* (Linn.).

"Green Heron.

"In small numbers. Resident."

24. *Ardea herodias* (Linn.).

"Great Blue Heron.

"Said to arrive later in the season."

Fam. COLUMBIDÆ.

25. *Chamæpelia passerina* (Linn.).

"Ground Dove. Abundant everywhere."

26. *Columba leucocephala* (Linn.).

"White-headed Pigeon.

"Rare among the southern hills. Think this their southern breeding limit, save perhaps Montserrat."

27. *Zenaida martinicana*, Bp.

"Turtle Dove. Not common among the hills."

Fam. TETRAONIDÆ.

28. *Ortyx virginianus* (Linn.).

"Quail."

"The pastures abandoned are fast becoming populated with quail; the acacia scrub forming agreeable shelter for them and protecting cover. So far as I can ascertain they were introduced; but at what period no one seems to know. They are now in sufficient numbers to make good sport. Think they breed at about the same season as the northern quail, as young but half-grown were plentiful in July and August."

The single specimen sent, a male, resembles most the primitive northern stock; it differs in being smaller, the skin measuring in length $8\frac{1}{4}$ inches, wing $4\frac{1}{4}$, and in having the crown and hind neck blackish, in this character resembling var. *floridanus*, but not otherwise; the transverse markings below being of the same size as those of the northern bird, which in the Florida race are twice the width.

In its upper plumage it is much like the male of *O. cubanensis* Gould (of which I have mounted specimens of both sexes), but they differ in their under plumage, the Antigua bird being like *O. virginianus*, but in *O. cubanensis* the black extends from the throat over the breast, and the feathers of the abdomen are rufous, with arrow-head markings of black and irregular tear-shaped white spots. The wing measures four inches.

The female of *O. cubanensis* has transverse markings on the under surface as in the typical form, but more strongly defined and wider; but they are not so wide as in var. *floridanus*; the crown, hind neck, and sides of the head are blackish where reddish-chestnut prevails in the northern bird; the back is grayish-ash, with no appearance of the pinkish-red, which exists in the female of *O. virginianus* on the back and on the upper part and sides of the breast.

Fam. RALLIDÆ.

29. *Rallus* ?

"Rail. Moor-hen. Resident; plentiful apparently, but shy."

30. *Fulica* ?

"'Coot.' Not seen; migrant."

Fam. CHARADRIIDÆ.

31. *Charadrius virginicus*, Borkh.

"Golden Plover.

"Sept. 7th, first of the season; generally arrive by last of August, or first storm after Aug. 25th. First of September rarely fails to bring them, but this year no storm hastened them along and they are very late. They arrive in large flocks and spread over the pastures, hills and plains, affording exciting sport. It is not an unusual thing to bag three or four dozen in a morning. Every one owning a gun turns out, and great slaughter ensues. If suffered to remain, they would acquire fat and stay for weeks, but they soon wing their way further south.

"They are accompanied later in the season by Curlew, Yellow-legs, etc."

Fam. SCOLOPACIDÆ.

32. *Himantopus nigricollis* (Vieill.).

"Black-neck Stilt.

"Rare; seen early in July."

33. *Gallinago wilsoni* (Temm.).

"English Snipe.

"Occasionally; authority of sportsmen."

34. *Ereunetes petrificatus* (Ill.).

"Sandpiper.

"Abundant, in flocks of four to six, along sandy shore. Resident."

35. *Symphemia semipalmata* (Gm.).

"Willet. Rare."

36. *Gambetta melanoleuca* (Gm.).

"Yellow-legs.

"In all the salt ponds or 'fleshes'; sufficiently numerous, at times, to afford sport; said to be resident in small numbers; I found it here early in July."

37. *Rhyacophilus solitarius* (Wils.).

"Sandpiper.

"Not common, but seen singly in every part of the island. I shot three specimens on the summit of McNish Mountain—the highest hill—where is a spring-hole of small size. From this mountain, by the way, the entire island can be viewed, as well as the islands of Barbuda, Guadeloupe, Montserrat, Redonda, Nevis and St. Kitts—a most delightful prospect."

38. *Numenius hudsonicus* (Lath.).

"Curlew. Not common."

Fam. LARIDÆ.

39. *Sterna dougalli*, Mont.

"Tern.

"Breeds in large numbers on the islands and rocks off shore; now finished breeding or young fully grown, though not in perfect plumage."

40. *Sterna*, sp.?

"A larger Tern than the above, with black back; not many seen. Resident."

41. *Larus atricilla* (Linn.).

"Gull. Resident."

Fam. ANATIDÆ.

42. *Dafla bahamensis* (Linn.).

"Duck. Resident."

From Barbuda.

Fam. TURDIDÆ.

1. *Cinclocerthia ruficauda*, Gould.

"Thrush. Grive."

Fam. SYLVICOLIDÆ.

2. *Dendroeca petechia* (Linn.).

"Yellow Warbler.

"Not plentiful. Resident; breeds."

Fam. CÆREBIDÆ.

3. *Certhiola dominicana*, Taylor.

"Yellow-throat. Common; resident."

Fam. FRINGILLIDÆ.

4. *Loxigilla noctis* (Linn.).

"Sparrow. Resident; breeds.

"Now in small flocks in the overgrown fields. Abundant."

5. *Phonipara bicolor* (Linn.).

"Grass-bird. Resident; breeds.

"Very familiar about yards. Abundant."

Fam. TYRANNIDÆ.

6. *Myiarchus obei*, Lawr.

"Flycatcher.

"Infrequently met with in the thick laurel scrub; cry sharp at long intervals; shy."

7. *Tyrannus rostratus*, Sel.

" 'Loggerhead.'

" Common; resident; breeds."

Fam. TROCHILIDÆ.

8. *Eulampis holosericeus* (Linn.).

" Hummingbird.

" Common, especially about the prickly pear and the cacti near the beach."

6. *Orthorhynchus exilis* (Gm.).

" Crested Hummer.

" Most numerous. Saw only these two species, but Rev. Mr. Couley (one of the proprietors) described a larger species, visiting the island later, resembling exactly (he said) the Mango, of which he had a colored plate."

Fam. CUCULIDÆ.

10. *Coccyzus minor* (Gm.).

" Cuckoo; 'four o'clock bird'; not common."

Fam. FALCONIDÆ.

11. *Tinnunculus sparverius* var. *antillarum* (Gm.).

" Sparrow Hawk.

" Very common; resident; breeds."

12. *Falco communis* var. *anatum*, Bp.?

" Hawk; answers to description of Duck Hawk; arrives with the flocks of Plover, etc., forages upon the wild-ducks."

Fam. FREGATIDÆ.

13. *Fregata aquila* (Linn.).

" Frigate Bird.

" Resident; breeds, lays in June, some young yet in nest."

Fam. PHÆTHONIDÆ.

14. *Phæthon flavirostris*, Brandt.

" Tropic Bird.

" Breeds in cliffs at east end of island."

Fam. PELECANIDÆ.

15. *Pelecanus fuscus* (Linn.).

" Brown Pelican. Breeds."

Fam. ARDEIDÆ.

16. *Ardea herodias*.

" Great Blue Heron.

" Arrives with the migratory birds about Sept. 1st."

17. *Herodias egretta* (Gm.)?

"A large White Heron was described to me as visiting the island."

18. *Florida cærulea* (Linn.).

"Small Blue Heron.

"Very numerous; resident; young white."

19. *Butorides virescens* (Linn.).

"Green Heron. Common; resident, breeds."

Fam. ANATIDÆ.

20. *Dafila bahamensis* (Linn.).

"'White throat Duck.' Resident; not common."

21. *Clangula glaucion* (Linn.).

"Whistler. Migrant; arrives in October."

Fam. COLUMBIDÆ.

22. *Columba leucocephala*, Linn.

"White-head Pigeon.

"Resident; breeds in great numbers in June and July."

23. *Zenaida martinicana*, Bp.?

"Turtle Dove. Extremely abundant; breeds."

24. *Chamæpelis passerina* (Linn.).

"Ground Dove. Exceedingly numerous; breeds."

Fam. NUMIDIDÆ.

25. *Numida meleagris*, Linn.

"Guinea Fowl.

"Plentiful; breeds abundantly; thoroughly wild. Introduced over one hundred years ago."

Fam. RALLIDÆ.

26. *Rallus* ?

"Rail. Not common; resident."

27. *Fulica* ?

"'Coot.' Migrant."

Fam. CHARADRIIDÆ.

28. *Charadrius virginicus*, Borkh.

"Golden Plover.

"Arrive in immense flocks first storm (N. W.) after Sept. 1st. Good shooting through September and October if weather is stormy; if fine, the bulk of them keep on."

29. *Ægialitis semipalmata* (Bp.)?

"Ring-neck Plover. Not common."

Fam. SCOLOPACIDÆ.

30. *Himantopus nigricollis* (Vieill.).

"Black-neck Stilt. Not common. Resident"?

31. *Gallinago wilsoni* (Temm.).

"Snipe.

"A species not seen by me, described by Mr. Hopkins (one of the lessees of the island) as an English Snipe, in color, flight and voice; in small numbers; resident."

32. *Ereunetes petrificatus* (Ill.).

"Least Sandpiper.

"Resident; breeds; now in flocks of 4-6."

33. *Symphemia semipalmata* (Gm.).

"Willet. Common; said to breed."

34. *Gambetta flavipes* (Gm.).

"Yellow-legs (smaller).

"Common; resident, or nearly so."

35. *Rhyacophilus solitarius* (Wils.)?

"Sandpiper.

"Resident; solitary about the lagoons and fresh-water ponds."

36. *Numenius hudsonicus* (Lath.).

"Curlew. Resident; breeds; common."

Fam. LARIDÆ.

37. *Sterna maxima*, Bodd.?

"Royal Tern. Seen only."

38. *Larus atricilla*, Linn.

"Gull. Breeds; resident."

Fam. PODICIPITIDÆ.

39. *Podilymbus podiceps* (Linn.)?

"'Diver' (Grebe?).

"Think it resident, as it is irregular in its appearance and disappearance."

NEW YORK, November 14, 1878.

NOTE ON *PERCA FLAVESCENS*.^{*}

By Dr. FRANZ STEINDACHNER.

Dr. Franz Steindachner, in the Sitzungsberichte of the Vienna Academy for July, 1878, makes some interesting statements regarding the American Yellow Perch, of which a translation is given below:—

"*Perca flavescens* of Mitchill, Cuvier, and others, can be regarded only as a variety of *Perca fluviatilis*, and the opinion of the ichthyologists prior to Cuvier was the correct one.

The pronounced striation of the operculum, which is a characteristic of *P. flavescens*, is not always present in American specimens, and Holbrook has already remarked in his description of *Perca flavescens* (Ichthyology of South Carolina, p. 3), "with radiating striæ more or less distinct."

During my stay at Lake Winnipiseogee, New Hampshire, I frequently saw specimens with very indistinctly striated, or with perfectly smooth opercles. A much stronger argument for the identity of *Perca flavescens* with *Perca fluviatilis* lies in the fact that in the vicinity of Vienna occasional individuals with more or less strongly furrowed opercles are taken, and also in the Neusiedler Sea; in the Sea of Baikal and its tributaries I obtained several specimens with very strongly striated opercles. During my travels in England I was able to find only the typical European form of *Perca fluviatilis* with the smooth opercle.

In my opinion, only two species of *Perca* can be distinguished, namely, *Perca fluviatilis*, Linn., with two not very sharply defined varieties, viz, var. *europæa* and var. *flavescens* or *americana*, and the high northern form *Perca Schrenkii*, Kessl.

In the number of longitudinal and vertical rows of scales, *Perca fluviatilis* cannot be distinguished from *P. flavescens*, both varieties having 7 to 10 (generally 7-9) scales between the base of the first dorsal spine and the lateral line, in a vertical row.

In Western North America there are known no members of *Perca* or any nearly allied genus, while in South America the rivers of Southern and Middle Chili and of Patagonia are inhabited by several (apparently only two) species of the *Perca*-like genera *Percichthys* and *Percilia*."

* Prepared by G. Brown Goode.

ON THE DESTRUCTION OF FISH IN THE VICINITY OF THE TORTUGAS
DURING THE MONTHS OF SEPTEMBER AND OCTOBER, 1878.

By Lieut. J. P. JEFFERSON, Dr. JOSEPH Y. PORTER, and
THOMAS MOORE.

The following information, relative to the dying of fish in the Gulf of Mexico during the month of September last, will be found of much interest, as bearing upon the sudden destruction in large numbers of marine animals, and their accumulation in geological strata.—EDITOR.

FORT JEFFERSON, DRY TORTUGAS, FLA.,
October 16, 1878.

I have the honor to enclose herewith the skin of a fish* which was found on the beach here. I send it because many old fishermen say that they never before saw one like it. Some five or six were picked up from a multitude of other fish; and to report this great mortality among them is my principal reason for addressing you. Some three or four weeks ago, the fishing-smacks over in Florida Bay lost about all their fish in their wells, and attributed it to fresh water, which they supposed had from some cause or other come down in great volume from the mainland. On the 9th instant, the sailing-vessel which connects us with Key West met water of a dark color about midway between here and there, but saw no dead fish. On her return, on the night of the 11th, she struck it off Rebecca Shoals, about 25 miles east of here, and found it extending some 10 miles out in the Gulf. That same night it came down upon us here, and the next morning the beach and surface of the water, as far as the eye could reach, were covered with dead fish. The appearance of the water had entirely changed; instead of the usual clear blue or green, it was very dark, like cypress water, and when viewed at depths over 10 feet, was almost black, precisely like the Saint John's River. We could not perceive any change in the saltness of the water but not having any other means of determining this, had to depend upon taste. There was no appreciable change in temperature. From the fact that almost all the fish that first came ashore were small and of such varieties as frequent shoal water, I infer that the dark water must have been of less density than the sea; still, great numbers of "grouper" have been seen, and these are generally found in 3 or 4 fathoms, I believe. The destruction must have been very great, for here, on a key containing but a few acres, and with a very limited extent of beach, we have buried at least twenty cart-loads; they have come ashore in such numbers that it has been a serious matter how to dispose of them.

*This on examination by Professor Gill was pronounced to be *Aulostoma coloratum*.

It is said that in 1856 or '57 there was a similar occurrence of limited extent over in the bay, and frequently the smacks fishing near shore along the coast meet fresh water which kills their fish; but all the fishermen here unite in saying that nothing of this kind has ever, to their knowledge, happened out on the reef. As to the extent of this I have no means of knowing; will endeavor to have forwarded with this, however, copies of the Key West papers, which will probably contain a more complete account than I have been able to give. One other fact in connection with this: among the dead fish were mullet, which, I believe, run up fresh- or brackish-water streams. Almost all the conchs around here were killed also. Whether or not sponges, coral, &c., have been affected, we have not been able to determine, the weather having been too rough to visit the beds.

I am, sir, very respectfully, your obedient servant,

J. P. JEFFERSON,

Lieutenant Fifth United States Artillery.

To Professor BAIRD.

FORT JEFFERSON, DRY TORTUGAS, FLORIDA,

November 4, 1878.

PROFESSOR: I have taken the liberty to forward you, by express from Key West, a box containing two "ribbon fish" preserved in alcohol. One of them was brought over to me by Mr. Moore, lighthouse-keeper at Loggerhead Light. The remaining specimen of "ribbon fish" in the jar (which is perfect) was picked up on a neighboring key this a. m. I am informed that these fish are a rare species, and very seldom seen.

The destruction of fish in Florida Bay and in this vicinity has been great this season. I obtained some sea-water, but not having the appliance for analyzing it, I have also taken the liberty to enclose it in the same box with the jar of fish.

Should you discover anything abnormal in the water which will account for the recent destruction of the fish in this vicinity, I will be under many obligations if you will inform me.

JOSEPH Y. PORTER,

Assistant Surgeon, U. S. Army, Post Surgeon.

P. S.—Since writing the above, Mr. Moore brought me some curious specimens of fish;* and a curious eel-like fish with but *one* eye, evidently an abnormality, has been found, which I have also enclosed in the box.

* The following is a list of species of fishes forwarded by Dr. Porter.—EDITOR.

Aulostoma coloratum, Müll. & Trosch.
Dactylopterus volitans, (Linn.) Lac.
Ceratacanthus aurantiacus, (Mitch.) Gill.

Monacanthus pardalis, Rüpp.
Blepharichthys crinitus, (Akerly) Gill.
Belone sp. (head).

The dark cypress looking water previously alluded to made its appearance here a day or so ago, but did not fortunately remain more than 24 hours, but during that period there was again destruction of fish.

Oct. 11th, at 7 a. m., saw the water a very dark color and dead fish drifting southwest; 9 a. m., dead fish on the beach and drifting by as far as we could see east and west of the Key.

Oct. 12th, 4 p. m., fish of all kinds on the beach, weighing from a few grains up to Jewfish, weighing about 150 lbs.

Oct. 13, 14, 15, and 16.—Dead fish drifting on this Key and at Fort Jefferson, distance from this Key $3\frac{3}{4}$ miles.

Names of some of the dead fish :—

Jewfish,	Common Garfish,
Yellow Tails,	Sucking Fish,
Mutton Fish,	Lump Suckers,
Grouper,	Muræna,
Skipjack,	Armed Enoplossus,
Runners,	Pennant's Globe Fish,
Grunts,	Horned Ostracion,
Porgie,	Great Pipe Fish,
Pogie,	Porcupine Fish,
Three-tailed Porgie,	Ribbon Fish,

and fish we call Parrot, and numberless fish I have no name for. There is a fish called Snapper that we could not find dead, and have not seen since alive up to the 27th, but the water remains quite clear.

Oct. 30 and 31.—The water colored a light brown. I do not see any fish dead or alive.

THOMAS MOORE,
Keeper of Loggerhead Light, Florida.

Canthorinus occidentalis, (Günther).
Tetrodon lineatus, (Linn.) Gill.
Chilichthys testudinens, (L.) Müll.
Ostracion quadricorne, Linn.
Acanthurus nigricans, Linn.

Heliastes insolatus?, Cuv. & Val., = *Chromis*
(*vide* Gill).
Pomacentrus leucostictus, Müll. & Trosch.
Apogon sp., probably *imberbis*.
Pareques acuminatus, (Bl. Sch.) Gill.

DESCRIPTIONS OF SEVERAL NEW SPECIES AND GEOGRAPHICAL
RACES OF BIRDS CONTAINED IN THE COLLECTION OF THE
UNITED STATES NATIONAL MUSEUM.

By ROBERT RIDGWAY.

RHODINOCICHLA ROSEA.

Specimens of this species from Western Mexico, while agreeing with Central American ones in the color of the throat, breast, etc., differ very conspicuously in their upper plumage, which is a clear slate-color, the flanks almost cinereous instead of dusky black. This difference is entirely constant in the four specimens before me, compared with five of the typical form. The Northern form being unnamed, it may be characterized as follows :—

Rhodinocichla rosea, β . *schistacea* (Ridgw. MS.).

CH.—Above clear slate-color, the wings darker, with paler, nearly cinereous edges to the feathers; lores and auriculars dark slate; entire sides clear slate, becoming more ashy on the flanks. *Adult male*: A continuous superciliary stripe, the anterior half of which is intense rose-red, the posterior half rosy-white; chin, throat, malar region, middle of the jugulum, breast, and abdomen, and the whole crissum, pure, beautiful rose-red, most intense on the jugulum, narrower and paler on the abdomen; edge of the wing and anterior lesser coverts also pure rose-red; lining of the wing partly grayish-white. *Adult female*: Similar, but the red replaced by rich, tawny rufous, the middle of the abdomen whitish. Bill horn-yellowish, the maxilla mostly dusky; iris red (Xantus, MS.) or brown (Grayson, MS.); feet dark horn-color. Length, 8.25; wing, 3.45–3.60; tail, 3.75–3.90; bill, from nostril, .60–.65; tarsus, 1.00; middle toe, .70–.75. *Hab.*—Western Mexico (Sierra Madre of Colima, Xantus; Rio Mazatlan, Grayson).

The distinctive characters of the two forms may be contrasted as follows :—

- a. rosea.*—Upper parts, sides, and flanks sooty-black, the flanks scarcely paler. Wing, 3.25–3.45; tail, 3.40–3.80; bill, from nostril, .52–.60; tarsus, 1.00–1.10; middle toe, .70–.80. *Hab.*—Central America (Panama; Veragua).
 β . schistacea.—Upper parts, sides, and flanks clear slate-color, the flanks almost cinereous. Wing, 3.45–3.60; tail, 3.75–3.90; bill, from nostril, .60–.65; tarsus, 1.00; middle toe, .70–.75. *Hab.*—Western Mexico.

In *R. schistacea*, the red is very slightly paler than in *R. rosea*, but the difference can be appreciated only on close comparison; the rufous in the female, however, is equally deep. The number of tail-feathers is occasionally 13, this being the number possessed by specimen 30,160. A note on the label of Colonel Grayson's male specimen is to the effect that the species is "a superb singer".

a. rosca.

53911	U. S.	♂ ad.	Panama		3.45	3.80	0.60	1.00	0.70
45626	U. S.	♂ ad.	Veragua (Santa Fé)		3.35	3.70	0.55	1.05	0.75
.....	R. R.	♂ ad.	do.		3.45	3.80	0.60	1.10	0.80
53910	U. S.	♀ ad.	Panama		3.25	3.40	0.52	1.00	0.75
45627	U. S.	♀ ad.	Veragua (Santa Fé)		3.25	3.75	0.52	1.05	0.75

β. schistacca.

30160	U. S.	♂ ad.	Sierra Madre, Colima	Apr. —, 1863	3.45	3.90	0.60	1.00	0.70
34057	U. S.	♂ ad.	Mazatlan	June —, 1862	3.50	3.80	.....	1.60	0.70
30161	U. S.	♂ ad.	Sierra Madre, Colima	Apr. —, 1863	3.60	3.75	0.65	1.00	0.75
34058	U. S.	♀ ad.	Mazatlan	June —, 1862	3.45	3.75	.....	1.00	0.70

EMBERNAGRA RUFIVIRGATA, Lawr.

Specimens from Merida, Yucatan, of which there are three before me, differ from all other Mexican examples in the collection, as well as those from Texas, in the very sharp definition and dark color of the stripes on the crown, these being a very dark brown—almost black—anteriorly, the broad stripe between a pure ash-gray, without a trace of olivaceous tinge. The bill is also very much darker in color, the maxilla being quite black in some examples, while the feet are also of a darker brown color. In the light grayish color of the flanks and the very pale buff of the crissum, these Merida examples agree much more closely with Texas specimens than those from Mexico.

Mexican examples are like those from Texas in the character of the head-stripes and in the color of the bill and feet, but they are very different in their lower plumage, not only from the true *rufivirgata*, but also from the Yucatan race, the flanks being a dark raw-umber tint, or deep drab, almost like the back, and in strong contrast with the white of the abdomen, while the crissum is of a deep fulvous, or dark grayish-buff.

It thus appears that three well-marked geographical races of this species may be defined, their characters being as follows:—

A. Maxilla reddish-brown; legs and feet pale brown. Stripes of the head not sharply defined, uniform reddish-umber-brown, the broad vertical stripe olive-green throughout, or only tinged with ash anteriorly.

a. rufivirgata.—Bill slender, its depth .25, the length of the maxilla from the nostril to the tip being .35-.38. Flanks pale grayish-buff, or light grayish-fulvous; crissum pale buff. Wing, 2.60-2.65; tail, 2.50-2.70; tarsus, .90-.95; middle toe, .60. *Hab.*—Rio Grande Valley of Texas.

β. crassirostris.—Bill very stout, its depth .28-.33, the length of the maxilla from the nostril to the tip being .35-.40. Flanks deep drab, or raw-umber brown; crissum deep fulvous. Wing, 2.55-2.75; tail, 2.30-2.70; tarsus, .85-.90; middle toe, .58-.65. *Hab.*—Mexico.

B. Maxilla dark brown, or brownish-black; legs and feet deep brown. Stripes of the head sharply defined, black anteriorly, chestnut mixed with black posteriorly, the broad vertical stripe clear ash-gray throughout.

γ. verticalis.—Bill slender, as in *rufivirgata*, its depth being .26-.28; its length from the nostril .35-.40. Flanks and crissum pale, as in *rufivirgata*. Wing, 2.50-2.68; tail, 2.60-2.80; tarsus, .85-.95; middle toe, .60. *Hab.*—Merida, Yucatan.

Following is a list of the specimens examined:—

a. rufivirgata.

					Wing.	Tail.		Tarsus.	Middle toe.
.....	R. R.	♂ ad.	Texas .....	.....	2.60	2.50	0.38 × 0.25*	0.90	0.60
.....	R. R.	♂ ad.	.....do	Mar. 28, 1876	2.65	2.70	0.35 × 0.25	0.95	0.60

* The first number indicates the length of the bill from the nostril; the second, its depth through the base.

β. crassirostris.

.....	G. N. L.	♂ ad.	Cordova .....	.....	2.75	2.85	0.40 × 0.32	0.90	0.60
29229	U. S.	♀ ad.	Orizaba	May 4, 1858	2.55	2.40	0.35 × 0.30	0.85	0.65
22443	U. S.	♂ ad.	"Mexico" .....	.....	2.55	2.70	0.34 × 0.33	0.90	0.65
23890	U. S.	♀ ad.	Venado Island, W. Mex.†	June —, 1861	2.60	2.30	0.35 × 0.28	0.90	0.58

† This specimen is somewhat intermediate in coloration between *rufivirgata* and *crassirostris*, but seems decidedly nearer the former. It differs from both, however, in the very sharp definition of the stripes on the head, which, however, are clear, uniform chestnut, and in the bright buff yellow cast of the crissum and tibia. It is quite possible that this specimen, which is not in good condition, may represent a fourth race, peculiar to Western Mexico.

γ. verticalis.

39282	U. S.	♀ ad.	Merida, Yucatan.	May 25, 1865	2.50	2.60	0.35 × 0.26	0.85	.....
37894	U. S.	♂ ad.	.....do	Feb. 28, 1865	2.60	2.80	0.40 × 0.28	0.90	0.60
.....	R. R.	♀ ad.	.....do	Mar. 19, 1865	2.68	2.75	0.40 × 0.28	0.95	0.60

Following are the chief references to this species:—

a. rufivirgata.

Embernagra rufivirgata, LAW., Ann. Lyc. N. Y. April 28, 1851, 112, pl. v, fig. 2 (Rio Grande, Texas) — BAIRD, B. N. Am. 1858, 487 (Ringgold Barracks, Texas; Nuevo Leon, N. E. Mexico); Mex. Bound Survey, II, Birds, 1859, 16, pl. xvii, fig. 2; Cat. N. Am. B. 1859, No. 373.—BUTCHER, Pr. Ac. Nat. Sci. Phil. 1868, 150 (Laredo, Texas).—COUES, Key, 1872, p. —; Check List, 1873, No. 209.—B. B. & R. Hist. N. Am. B. II, 1874, 47, pl. xxviii, fig. 3.—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 89 (Ft. Brown, Texas; deser. nest and eggs); Proc. U. S. Nat. Mus. I, 1878, p. 128 (Ft. Brown, Tex.; biegr.).—SENNETT, Bull. U. S. Geol. and Geog. Survey Terr. IV, No. 1, 1878, 22 (Brownsville and Hidalgo, Texas; common).

Brown-striped Olive Finch, LAW., *l. c.*

Texas Finch, BAIRD, *l. c.*

Green Finch, COUES, *l. c.*

β. crassirostris.

? "Zonotrichia plebeja, LICHT.", BONAP., Compt. Rend. XLIII, 1856, 413.*

"*Embernagra rufivirgata*", SCL., P. Z. S. 1856, 306 (Cordova); 1859, 380 (Playa Vicente); Catal. 1861, 117, No. 709 (Orizaba).—LAW., Bull. U. S. Nat. Mus. No. 4, 1876, 22 (Huemelula, Isth. Tehuantepec).—SUMICHR., Mem. Bost. Soc. I, 1869, 551 (Vera Cruz; temp. and hot reg., up to 1,200 metres).

Embernagra rufivirgata var. *crassirostris*, BAIRD, MS.

γ. verticalis

"*Embernagra rufivirgata*", LAW., Ann. Lyc. N. Y. IX, 1869 (Merida, Yucatan).

* I have at present no means of verifying this reference, and therefore adopt, provisionally at least, Professor Baird's MS. name of *crassirostris*.

LOXIGILLA VIOLACEA.

A specimen of this species from the Bahamas differs from Jamaican examples in larger bill and feet and much more intensely black plumage; the chestnut-red of the throat, etc., being also deeper and richer. These differences being probably geographical, the Bahaman form seems entitled to a distinctive name, and I therefore propose that of *bahamensis*.

The characters of the two races may be defined as follows:—

- a. violacea*.—Plumage of the body more or less decidedly slaty posteriorly; lining of the wing white. Throat, eyebrow, and crissum bright cinnamon-rufous. Wing, 3.00–3.30; tail, 2.90–3.20; bill, from nostril, .40–.45; depth of bill, .40–.48; tarsus, .70–.80; middle toe, .55–.60. *Hab.*—Jamaica.
- β. bahamensis*.—Plumage of the body lustrous black posteriorly; lining of the wing dark grayish. Throat, eyebrow, and crissum rich purplish rufous. Wing, 3.25; tail, 2.95; bill, from culmen, .45; depth of bill, .50; tarsus, .85; middle toe, .65. *Hab.*—Bahamas. (Type, 74,707, Nat. Mus. Bahamas; Dr. Bryant.)

a. violacea.

74711	U. S.	♂ ad.	Jamaica.....	Feb. —, 1865	3.30	3.20	0.45×0.43	0.80	0.60
.....	R. R.	♂ ad.	.....do.....	(?)	3.00	2.90	0.40×0.40	0.70	0.55
1800	R. R.	♀ ad.do.....	Aug. 8, 1859	3.10	3.00	0.42×0.40	0.80	0.60

β. bahamensis.

74707	U. S.	♂ ad.	Bahamas.....	(i)	3.25	2.95	0.45×0.50	0.85	0.65
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ANAS ABERTI (Ridg., MS.).

SP. CH.—*Adult female*: Size of *Querquedula discors* and *cyanoptera*, but in coloration closely resembling *A. fulvigula*. Prevailing color ochraceous-buff, but this everywhere relieved by brownish-black spots or streaks. Head, neck, and lower parts streaked, the streaks finest on the neck and sides of the head, broadest on the jugulum and crissum, which is somewhat tinged with rusty, and assuming the form of oblong spots on the abdomen, thighs, and anal region; throat immaculate. Back, scapulars, and rump with the blackish predominating; the feathers bordered with ochraceous; those of the back and the scapulars with irregular indentations and occasional bars of the same. Lesser wing-coverts brownish-slate, bordered with dull earthy-brown; middle coverts with their exposed portion velvety-black, forming a distinct bar. Secondaries widely tipped with pure white (forming a conspicuous band about .35 of an inch wide), this preceded by a velvety-black bar of about equal width, the basal half or more (of the exposed portion) consisting of a metallic speculum of dark grass-green, varying to blue and violet in certain lights. Tertiaries opaque velvety-black exteriorly, the inner webs brownish-slate; primary-coverts and primaries brownish-slate, the latter edged with lighter. Tail brownish-gray, the feathers

edged and coarsely spotted with light buff.* Bill light yellowish brown, darker on the culmen, the unguis dusky; feet light yellowish (probably orange in life). Wing, 8.50; tail, 3.25; culmen, 1.65; greatest width of the bill, .60; depth of maxilla through the base, .50; tarsus, 1.30; middle toe, 1.70.

Type, No. 12,789, U. S. Nat. Mus.; Mazatlan, Mexico; Colonel Abert.

REMARKS.—This remarkable little duck is very different from any other species known to me. In its small size, and, to a certain extent, the narrow bill, it is like the species of *Querquedula*, but its coloration calls instantly to mind the *Anas fu vigula* from Florida, and the species from the Sandwich Islands, recently described by Mr. Sclater. The specimen is marked as being a female, so it is possible that the male may be more brilliant in plumage.

In addition to the characters given above, it may be mentioned that there is a distinct indication of a narrow, dusky, postocular streak, and of a wider and less distinct loreal stripe, thus separating a light superciliary stripe from the light color of the cheeks. The lining of the wing and the axillars are pure white, the latter with a segregation of dusky spots near the carpo-metacarpal joint.

In the collection of the National Museum, there is a female specimen of the recently described *Anas wyvilliana* of the Sandwich Islands. Mr. Sclater's description was fortunately seen just in time to prevent the renaming of the species. Since Mr. Sclater describes only the male, however, a description of the opposite sex, which seems to differ but little in coloration, may not be out of place in this connection:—

ANAS WYVILLIANA, Sclater.*

Adult female: Smaller than *A. boschas* or *A. obscura*, but somewhat resembling the female of the former in plumage, being much darker, however. Prevailing color a mixture of rusty ochraceous and brownish dusky, the latter predominating on the upper surface, the former on the lower, the abdomen considerably paler. Eyelids pure white, forming a distinct but narrow orbital ring. Head and neck finely and densely streaked with blackish and pale ochraceous, the pileum nearly uniform blackish; jugulum and breast with broad crescentic or U-shaped marks of dusky, each enclosing a cauate or oblong longitudinal spot of the same along the shaft; abdomen and anal region thickly spotted with lighter grayish-brown; flanks with markings similar to those on the breast, but much larger; crissum strongly tinged with bright rusty, the larger feathers uniform black towards ends. Back and scapulars dusky, the feathers with ochraceous borders, enclosing another V- or U-shaped mark of the same; rump blackish, the feathers with only the external ochraceous border; upper tail-coverts blackish, marked much like the scapulars, only more irregularly. Tail brownish-slate, the feathers edged with whitish, and with three or four narrow bars of pale

* P. Z. S. Mar. 19, 1878, p. 350.

buff (V-shaped) on each feather, more apparent on the outer rectrices. Lesser wing coverts dark grayish brown, distinctly bordered with dull ochraceous; middle coverts with the concealed portion brownish-gray; this succeeded by a paler grayish shade, the most of the exposed portion being opaque velvety-black, forming a distinct broad band; secondaries metallic dark bluish-green, changing to blue and violet, this succeeded by a subterminal band of opaque velvety-black, about .25 in width, and this by a terminal band of pure white of the same width; outer webs of the two lower tertials opaque black, the rest grayish-brown, more brown on outer webs; primaries brownish-slate, with slightly paler edges. Bill dusky (probably dark olivaceous in life); legs and feet light yellowish-brown (probably orange in life). Wing, 9.00; tail, 3.65; culmen, 1.75; greatest width of bill, .68; depth of maxilla, through base, .55; tarsus, 1.40; middle toe, 1.70. [Described from No. 20,319 U. S. Nat. Mus.]

Unlike the somewhat similar species from Mazatlan (*A. aberti*), as well as the female of *A. boschas* and both sexes of *A. fulvigula*, the whole throat is densely streaked, like the neck. The entire lining of the wing, with the axillars, is pure white, as in allied species.

Gray's *Hand-list* quotes, under *A. boschas*, an "*A. freycineti*, Bp.", with the locality "Sandwich I." standing opposite. No indication is given, however, as to where Bonaparte's bird is described, and I have been unable to find any further clue. Should the locality of "*A. freycineti*" be the Sandwich Islands, it is very probable that this is the same species.

The female of *A. wyvilliana* scarcely needs comparison with that of *A. boschas*. It is much smaller, the colors altogether darker, the speculum green instead of violet, and preceded by a wide black instead of a wide white bar. The white ocular ring is also a peculiar feature.

NOVEMBER 18, 1878.

DESCRIPTION OF TWO NEW SPECIES OF BIRDS FROM COSTA RICA, AND NOTES ON OTHER RARE SPECIES FROM THAT COUNTRY.

By ROBERT RIDGWAY.

A small collection of birds brought from Costa Rica by Mr. José C. Zeledon includes several exceedingly rare and interesting species, among which may be mentioned a young male of *Carpodectes nitidus*, a second specimen of *Porzana cinereiceps*, Lawr., the recently described "*Zonotrichia*" *vulcani*, and *Phanoptila melanozantha*, besides *Pyrgisoma capitalis*, *Panterpe insignis*, *Geotrygon costaricensis*, etc. In addition to the above are the two following, which are believed to be undescribed:—

1.—THRYOPHILUS ZELEDONI (Lawrence, MS.).

SP. CH.—Wing, 2.50–2.60; tail, 2.15–2.45; bill, from nostril, .48–.50; tarsus, 1.00; middle toe, .62–.65.

Above brownish-slate, becoming more olivaceous on the rump, upper tail-coverts, and tail. Remiges with very indistinct (scarcely observable) darker bars. Tail heavily but somewhat irregularly barred with dusky black, the black bars about as wide as the interspaces. A sharply defined and conspicuous superciliary stripe of white; a wide stripe of brownish-slate (like the crown) along upper half of the auriculars. Chin, throat, cheeks, and lower parts in general grayish-white, with a faint grayish wash across the jugulum, more distinct on the sides of the breast. Flanks, anal region, and crissum light fulvous. Lining of the wing grayish-white. [Type in Mus. R. R.]

This well-marked species, although perhaps most like *T. modestus* (Caban.), is very distinct from that bird. The size is much greater, the plumage altogether grayer, and the bars on the tail broader and more sharply defined. Their characters may be more precisely contrasted, as follows:—

T. modestus.—Wing, 2.30; tail, 2.25–2.35; bill, from nostril, .40–.45; tarsus, .80–.90; middle toe, .52–.58. Above, grayish-umber, becoming gradually more grayish on the pileum. Tail cinnamon-umber, with narrow and rather indistinct bars of blackish less than half as wide as the interspaces. Lower parts buffy-white, without grayish shade across the jugulum; sides, flanks, and anal region, and crissum deep ochraceous. *Hab.*—Highlands of Costa Rica.

T. zeledoni.—Wing, 2.50–2.60; tail, 2.15–2.45; bill, from nostril, .48–.50; tarsus, 1.00; middle toe, .62–.65. Above, brownish-slate, more olivaceous posteriorly. Tail grayish-brown, with broad and sharply defined bars of blackish, equal in width to the interspaces. Lower parts grayish-white, with a distinct grayish shade across the jugulum; flanks, anal region, and crissum light grayish-fulvous. *Hab.*—Atlantic lowlands of Costa Rica.

2.—PSEUDOCOLAPTES LAWRENCII (Ridgway, MS.).

SP. CH.—Wing, 4.15–4.35; tail, 4.15–4.30; bill, from nostril, .50; tarsus, 1.00–1.05; middle toe, .68–.70. Primaries, primary-coverts, greater and middle wing-coverts brownish-black, the first more brownish; both rows of wing-coverts tipped with bright ochraceous. Tufts on sides of neck creamy buff.

Adult: Pileum, nape, and auriculars brownish-black, streaked with rusty-fulvous; nape more conspicuously streaked with light fulvous or buff; a narrow superciliary streak of buff. Back, scapulars, lesser wing-coverts, and tertials ferrugineous, the feathers of the back very indistinctly bordered terminally with dusky. Rump, upper tail coverts, and tail bright brick-rufous, immaculate. Chin, throat, and sides of the neck creamy-buff, the latter deepest, and immaculate; the throat faintly barred with dusky; jugulum and breast light buff, the feathers bordered with dusky, producing a conspicuously striped appearance—the dusky prevailing laterally, the buff medially; middle of the abdomen plain deep buff. Sides and flanks ferrugineous, considerably lighter than the back; crissum plain rusty-ochraceous. Bill blackish, the gonys whitish. Feet horn-color (greenish-olive in life). Iris dark brown.

Immature: Similar, but pileum and auriculars plain brownish-black; chin and throat more heavily marked (squamated) with dusky, and sides brighter rufous. Superciliary streak obsolete, except above the auriculars.

Hab.—La Palma and Navarro, Costa Rica (altitude about 3,500–5,000 feet).

The most striking characters of the two known species of this genus may be contrasted as follows:—

P. boissoneauti.—Tufts on side of neck pure white. Primaries and wing-coverts ferruginous-umber. Jugulum faintly squamated with dusky. *Hab.*—New Granada and Ecuador.

P. lawrencii.—Tufts on side of neck creamy-buff. Primaries and wing-coverts brownish-black. Jugulum heavily striped with dusky. *Hab.*—Costa Rica.

The proportions of both species are exceedingly variable, as may be seen from the accompanying table of measurements, and are therefore of no use as specific characters.

The new form (*P. lawrencii*) was also obtained by Mr. A. Boucard at Navarro, Costa Rica, but that gentleman evidently overlooked the more important differences of plumage, though he alludes to the different color of the neck-tufts (Proc. Zool. Soc. Lond. 1878, p. 59), adding that he does not “for the present consider this difference sufficient to make another species of it”.

Following is a more detailed description of *P. boissoneauti*, and tables of measurements of both species.

PSEUDOCOLAPTES BOISSONEAUTI, Lafr.

SP. CH.—Wing, 3.85–4.65; tail, 3.70–4.60; bill, from nostril, .42–.70; tarsus, .95–1.10; middle toe, .58–.70. Primaries and wing-coverts umber-brown, like the tertials; primary-coverts, dusky. Tufts on sides of neck pure white.

Adult: Pileum, auriculars, nape, and anterior portion of back brownish-black, streaked with pale fulvous, these streaks much broader, and very conspicuous, on the nape and back. Lower part of back, scapulars, and wings ferruginous-umber, the middle and greater coverts tipped with fulvous. Rump, upper tail-coverts, and tail deep brick-rufous, immaculate. A narrow superciliary streak of pale buff. Chin and throat white; neck-tufts pure silky white. Jugulum and breast buffy white, or very pale buff, faintly squamated with dusky, these markings heavier on sides of the breast. Rest of lower parts plain ochraceous-rufous, slightly paler on the middle of the abdomen. Bill black; lower half of mandible whitish.

Young: Pileum and auriculars plain brownish-black; superciliary stripe obsolete, except above the auriculars. Bill wholly black, but somewhat paler on gonys.

P. boissoncauti.

.....	G. N. L.	Juv.	Bogota, Columbia	4.15	4.20	0.42	.....	.....
.....	G. N. L.	♀ ad.	do	3.85	4.00	0.62	1.00	0.60
32800	U. S.	♂ ad.	do	3.90	3.70	0.70	0.95	.....
47076	U. S.	— ad.	do	4.50	4.55	0.48	0.95	0.58
.....	G. N. L.	♀ ad.	do	4.50	4.40	0.48	1.00	0.60
.....	G. N. L.	♀ ad.	Quito, Ecuador	4.10	4.00	0.60	1.00	.....
55272	U. S.	— ad.	do	4.65	4.30	0.52	1.10	0.62
63722	U. S.	— ad.	do	4.60	4.60	0.52	1.10	0.70
30945	U. S.	— ad.	do	4.40	4.50	0.50	1.10	0.65

P. lawrencii.

.....	U. S.	♂	La Palma, Costa Rica	4.15	4.15	0.50	1.00	0.70
.....	U. S.	♂	do	4.35	4.30	0.50	1.05	0.68

CARPODECTES NITIDUS.—A presumed young male of this excessively rare species, from Pacuare, Costa Rica, resembles the adult male, except that the terminal half (of the exposed portion) of the primaries is uniform dusky blackish, while the secondaries have a considerable part of their concealed portion dusky, the amount decreasing toward the inner ones, the tertials being entirely white; the primary-coverts have also their terminal half grayish dusky, while of the alulae one feather on one side and two on the other are of the same color. The rump is also somewhat obscured by a grayish tinge. The pileum seems to be of a deeper shade of fine pearl-blue in this specimen than in an adult male in the National Museum from Nicaragua. Mr. Zeledon's specimen measures as follows:—Wing, 5.40; tail, 3.00; bill, from nostril, .45; tarsus, .95; middle toe, .85.

JUNCO VULCANI (Boucard).—This interesting new species was originally discovered by Mr. Zeledon in 1873, but the specimens which were then forwarded by him to the Smithsonian Institution, along with other species then new, but since, like the present one, rediscovered, never reached their destination. Specimens more recently collected by Mr. Zeledon are now before me, and upon examination I find that the species should be referred to the genus *Junco*, rather than to *Zonotrichia*. In fact, it agrees perfectly in its generic characters with the former, except that the back is streaked, while there is no white on the lateral tail feathers. Like *J. cinereus* of the highlands of Mexico, and *J. alticola* of Guatemala, it has a bright yellow iris. Its alpine habitat—the summit of the Volcan de Irazu—still further favors this view of its affinities.

NOVEMBER 18, 1878.

DESCRIPTIONS OF TWO GADOID FISHES, *PHYCIS CHESTERI* AND *HALOPORPHYRUS VIOLA*, FROM THE DEEP-SEA FAUNA OF THE NORTHWESTERN ATLANTIC.

By G. BROWN GOODE and TARLETON H. BEAN.

Three specimens of an undescribed species of *Phycis* were obtained by the U. S. Fish Commission during the past season. The larger one measured 0.242^m without caudal and two others respectively 0.143^m and 0.128^m. The former is the basis of the following diagnosis; the others being evidently immature and having the characteristics of the species, especially the length of the fin-filaments, less pronounced.

Phycis Chesteri, sp. nov.

Head contained in body (without caudal) $4\frac{1}{3}$ times, height of body 5 times. Diameter of orbit in length of head $3\frac{1}{3}$ times, maxillary twice. Barbel about one-third of diameter of orbit. Vent situated under 12th ray of second dorsal, and equidistant from tip of snout and end of second dorsal. Distance of dorsal fin from snout equal to twice the length of the mandible; the third ray of the first dorsal is extremely elongate, extending to a point (33d ray of second dorsal) two-thirds of the distance from snout to tip of caudal, its length more than twice that of the head, and more than four times as long as the rays immediately preceding and following it. Anal fin inserted immediately behind the vent, its distance from the root of the ventrals equal to that of the dorsal from the snout. As in the other species of the genus,* the ventral is composed of three rays, the first two much prolonged. The first is contained three times in the length of the body, the second is almost three times as long as the head, reaching to the 40th anal ray or $\frac{3}{4}$ of the distance from snout to tip of caudal; the third is shorter than the diameter of the orbit.

The pectoral is four times as long as the operculum. Scales large and thin, easily wrinkling with the folding of the thick loose skin, particularly in the median line of the sides of the body. Lateral line much broken on the posterior half of the body.

Scales 7, 90-91, 28.

Radial formula:—D. 9 or 10, 55 to 57. A. 56. C. 5, 18 to 21, 5. P. 17-18. V. 3.

*A critical study of the ventral fins of *Phycis* compels us to believe that the ventral fin is composed of three rays covered at the base with a thick skin in such manner as to obscure the third, short one, and to join the other two so that they appear like a single bifid ray. In young individuals of *Phycis chuss*, the third ray has its extremity protruding from the sheath, though in adults it becomes entirely enveloped, thus giving rise to the false definitions which have been given for this genus. An adult specimen of *Phycis furcatus*, Flem. (No. 17,371 of the National Museum collection), has the third ventral ray protruding.

Table of Measurements.

Current number of specimen	21,840.		21,841.		21,842.	
	Trawl 174.		Trawl 194.		Trawl 194.	
Locality	42 miles E. & S., Cape Ann, 140 fathoms, Aug. 27, 1878.		33 miles E. by S., Cape Ann, E. Pt., 110 fathoms, Aug. 31, 1878.			
	Millim.	100ths of length.	Millim.	100ths of length.	Millim.	100ths of length.
Extreme length (exclusive of caudal)	242	.....	143	.....	128	.....
Length to end of middle caudal rays	280	.....	166	.....	148	.....
Body:						
Greatest height	49	20	29	.....	23	.....
Greatest width	28	11½	.....	.....	.....	.....
Height at ventrals	39	16	23	.....	20	.....
Least height of tail	9	4	6	.....	5	.....
Head:						
Greatest length	56	23	33	.....	30	.....
Length of barbel	6	2½	4	.....	.....	.....
Greatest width	29	11½	16	.....	14	.....
Width of interorbital area	10	4½	7	.....	6	.....
Length of snout	15	6½	8	.....	6	.....
Length of operculum	13	5½	8	.....	7	.....
Length of maxillary	28	11½	17	.....	14	.....
Length of mandible	32	13	19	.....	17	.....
Distance from snout to centre of orbit	24	10	14	.....	12	.....
Diameter of orbit	17	7	10	.....	10	.....
Dorsal (first):						
Distance from snout	67	27½	38	.....	34	.....
Length of base	17	7	10	.....	10	.....
Length of first ray	15	6½	8	.....	8	.....
Length of second ray	28	11½	19	.....	15	.....
Length of third ray	117	48	50	.....	42	.....
Length of fourth ray	26	10½	15	.....	15	.....
Length of last ray	3	1½	15	.....	4	.....
Dorsal (second):						
Length of base	142	58	88	.....	79	.....
Length of first ray	15	6½	.....	.....	.....	.....
Length of longest ray (40th)	29	11½	17	.....	15	.....
Length of last ray	5	2½	4	.....	.....	.....
Anal:						
Distance from snout	121	50	64	.....	57	.....
Length of base	108	44	70	.....	64	.....
Length of first ray	9	4	.....	.....	.....	.....
Length of longest ray (37th)	20	8½	12	.....	.....	.....
Length of last ray	6	2½	.....	.....	.....	.....
Caudal:						
Length of middle rays	38	15½	23	.....	20	.....
Length of external rays	36	14½	20	.....	17	.....
Pectoral:						
Distance from snout	60	12½	34	.....	30	.....
Length	52	21½	32	.....	29	.....
Ventral:						
Distance from snout	54	22½	30	.....	28	.....
Length of first ray	96	39	47	.....	42	.....
Length of filaments	165	68	81	.....	70	.....
Length of second ray	15	6½	10	.....	8	.....
Branchiostegals	VII	.....	7	.....	7	.....
Dorsal	9-55	.....	9-57	.....	10-56	.....
Anal	47	.....	47	.....	47	.....
Caudal	5-18-5	.....	5-21-5	.....	5-21-5	.....
Pectoral	17	.....	17	.....	18	.....
Ventral	3	.....	3	.....	3	.....
Number of scales in lateral line	90	.....	ca. 91	.....	ca. 90	.....
Number of transverse rows above lateral line	7	.....	7	.....	7	.....
Number of transverse rows below lateral line	28	.....	28	.....	ca. 28	.....

Haloporphyrus viola, sp. nov.

Two specimens of an undescribed species of the genus *Haloporphyrus* of Günther were brought in, August 24, by Captain Joseph W. Collins, of the schooner "Mariou" of Gloucester; they were taken on a halibut trawl-line on the outer edge of Le Have Bank, at a depth of four or five

hundred fathoms. A species of this genus was described, under the name *Gadus lepidion*, by Risso,* from Mediterranean specimens. Günther, who referred the species to the new genus *Haloporphyrus* in 1862,† had a specimen from Madeira. Günther published preliminary notices of two species, *H. rostratus* and *H. australis*, in "The Annals and Magazine of Natural History", July, 1878, pp. 18 and 19, which were collected by the Challenger. The affinities of the four known species are indicated below.

Table of Affinities.

	<i>Haloporphyrus lepidion</i> .	<i>Haloporphyrus viola</i> .
Head	Contained 4 times in total length (without caudal).	Contained over 4 times in total length (without caudal).
Orbit	With diameter $\frac{1}{2}$ length of head	With diameter $\frac{1}{2}$ length of head or slightly more.
Maxillary	Not extending to the vertical from posterior margin of orbit.	Extending to vertical from posterior margin of orbit.
Barbel	Longer than diameter of orbit	Scarcely equal to half diameter of orbit.
Vent.	Inserted under 12th ray of second dorsal fin.	Inserted under 19th ray of second dorsal fin.
Anal	Inserted directly behind the vent, with slight depression in its middle, and terminating in advance of termination of dorsal.	Inserted behind the vent at a distance equal to length of 2d anal ray, with a considerable depression in its middle, and terminating in a line with termination of dorsal.
Pectoral	More than half as long as head	More than four-fifths as long as head.
Ventral	Inner ray as long as head, and reaching to the vent.	Inner ray shorter than head ($\frac{2}{3}$) and reaching half-way to the vent.
Radial formula	D. 4, 54; A. 49; V. 6	D. 4, 53; A. 40; V. 6.
Scales	In lateral line, 210	In lateral line, 115.
	Above lateral line, 15	Above lateral line, 11.
Habitat	Madeira	Le Have, 400-500 fathoms.
	<i>Haloporphyrus rostratus</i> .	<i>Haloporphyrus australis</i> .
Head .....	.....	One-fourth of total without caudal; depth of body two-fifths.
Anal	Imperfectly divided, approaching, in that respect, the genus <i>Mora</i> . Günther makes this the type of a distinct sub-genus, <i>Antimora</i> .	
Radial formula	B. VII; D. 4, 51-56; A. 38-39; V. 6. . .	D. 9, 50-52; A. 53; V. 8.
Habitat	Deep-sea, midway between Cape of Good Hope and Kerguelen's Land; east of the mouth of Rio Plata, 600 and 1,375 fathoms.	Puerto Bueno, Magellan Straits, 55-70 fathoms.

Description.—Extreme length of type-specimen (No. 21,837, U. S. N. M.) without caudal 0.435^m ($17\frac{1}{2}$ inches), with caudal 0.48^m ; length of collateral type (No. 21,838) without caudal, 0.545^m ; with caudal, 0.603^m . The shape of the body resembles that of the species of the genus *Phycis*, though somewhat shorter, higher, and more compressed, its greatest height contained about five times in its length (without caudal), its height at the ventrals slightly exceeding one-eighth of its total length,

* Ichthyologie de Nice, 1810, p. 118, pl. xi, fig. 40.

† Catalogue of the Acanthopterygii, Pharyngognathi, and Anacanthini in the Collections of the British Museum, 1862, p. 358.

its height at the middle of the caudal peduncle one twenty-ninth of the same.

Scales arranged in about 115 vertical rows and about 38 horizontal ones, about 11 being between the origin of the dorsal and the lateral line and about 27 below the lateral line. Lateral line slightly curved upward in the anterior fourth of its length.

Length of head contained more than four and one-quarter times in that of the body; its width half its length and less than double that of interorbital area.

The barbel is short, its length being scarcely equal to half the diameter of the orbit and about one-tenth the length of the head. The width of interorbital area is about equal to the longitudinal diameter of the orbit, in the larger specimen slightly greater. The diameter of the orbit is equal to or slightly greater than one-fourth the length of the head. The length of the snout is equal to that of the operculum and less than width of interorbital area.

The maxillary extends to vertical from posterior margin of the orbit, its length about equal to the greatest width of the head. Mandible equals one-eighth of total length without caudal.

Snout equal to operculum in length, obtusely pointed, much depressed, its lateral outline subconical, a conspicuous keel extending backward along the lower line of the orbit to its posterior margin. The head and mouth closely resemble those of some species of *Macrurus*, except that the keel is covered with small, smooth scales and is not overhanging. Lips scaleless.

Teeth in the jaws imperfectly serial, villiform, recurved; a small oblong patch of similar teeth on the head of the vomer; none on the palatines.

First dorsal fin inserted at a distance from the snout somewhat greater than twice the height of the body at the ventrals; its first ray is much prolonged, its length greater than that of the head, and nearly as long or longer (in the larger specimen) than the distance from the snout to the beginning of the dorsal. The second ray is contained less than four times, the third six times or less in the first, the fourth about ten times. The length of the base of second dorsal is somewhat more than twice the distance of its insertion from the snout; its greatest height, which is in the posterior fourth of its length (near the 40th ray), is contained about six or seven times in the length of its base.

The vent is situated at a point equidistant from snout and tip of caudal, under the 19th ray of second dorsal fin. The anal fin is inserted at a distance behind it equal to length of second anal ray. Its length of base is slightly more than half that of second dorsal. It has a considerable depression in its middle outline. The last rays of dorsal and anal are of equal length, and are directly opposite each other.

The caudal seems to be somewhat rounded. The length of the middle rays contained more than nine times in total length without caudal, and more than ten times in length including caudal.

Pectorals narrow, inserted under the base of first dorsal. In the smaller specimen they reach to the perpendicular from the ninth ray of the second dorsal, in length equalling the greatest height of the body.

Ventrals inserted at a distance from tip of snout equal to half the length of anal base; the second ray nearly twice as long as the first, and in the smaller specimen, in which it is unmutilated, nearly as long as the head.

Radial formula:—D. 4, 53; A. 40; C. 5, 20 or 21, 5; P. 1, 19; V. 6.

Color.—Deep violet or blue.

Table of Measurements.

Current number of specimen	21,837.		21,838.	
Locality	Edge of Le Have Bank.			
	Millim.	100ths of length.	Millim.	100ths of length.
Extreme length (without caudal).....	435	.....	545	.....
Length to end of middle caudal rays.....	420	.....	603	.....
Body:				
Greatest height.....	ca. 83	19	.....	.....
Greatest width.....	44	10	.....	.....
Height at ventrals.....	55	12½	.....	.....
Least height of tail.....	15	3½	.....	.....
Length of caudal peduncle.....	19	4½	.....	.....
Head:				
Greatest length.....	100	23	125	23
Length of barbel.....	10	2½	13	2½
Greatest width.....	50	11½	63	11½
Width of interorbital area.....	27	6½	35	6½
Length of snout.....	25	6	27	5
Length of operculum.....	25	6	27	5
Length of maxillary.....	49	11	62	11½
Length of mandible.....	55	12½	74	13
Distance from snout to centre of orbit.....	44	10	50	9½
Diameter of orbit (longitudinal).....	27	6½	32	6
Dorsal (first):				
Distance from snout.....	113	26	136	25
Length of base.....	16	4	25	4½
Length of first ray.....	107	24½	140	25½
Length of second ray.....	25	6	33	6
Length of third ray.....	19	4½	22	4½
Length of fourth ray.....	10	2½	14	2½
Dorsal (second):				
Length of base.....	273	62½	340	62
Distance from snout.....	133	30½	160	29
Length of first ray.....	27	6½	33	6
Length of longest ray (41st).....	32	7½	53	9½
Length of last ray.....	8	2	.....	.....
Anal:				
Distance from snout.....	266	61	.....	.....
Length of base.....	142	32½	.....	.....
Length of first ray.....	10	2½	.....	.....
Length of longest ray (26th).....	35	8	.....	.....
Length of last ray.....	8	2	.....	.....
Caudal:				
Length of middle rays.....	ca. 45	10½	ca. 58	10½
Pectoral:				
Distance from snout.....	104	23½	137	25
Length.....	83	19	105	19
Ventral:				
Distance from snout.....	71	16	.....	.....
Length of first ray.....	48	11	52	10
Length of second ray.....	92	21	.....	.....
Braichistegals.....	.....	VII	.....	VII
Dorsal.....	.....	4, 53	.....	4, +
Anal.....	.....	40	.....	40
Caudal.....	.....	5, 20 or 21, 5	.....	.....
Pectoral.....	.....	1, 19	.....	1, 19
Ventral.....	.....	6	.....	.....
Number of scales in lateral line.....	.....	ca. 115	.....	.....
Number of transverse rows above lateral line.....	.....	ca. 11	.....	.....
Number of transverse rows below lateral line.....	.....	ca. 27	.....	.....

DESCRIPTION OF ARGENTINA SYRTENSIIUM, A NEW DEEP-SEA FISH FROM SABLE ISLAND BANK.

By G. BROWN GOODE and TARLETON H. BEAN.

The United States Fish Commission has lately received from Capt. Joseph W. Collins, of the schooner Marion, of Gloucester, Mass., and from Mr. R. L. Newcomb, of Salem, who accompanied him on this voyage as a collector, an apparently undescribed species of *Argentina*. A single specimen was taken September 4, 1878, from the stomach of a hake (*Phycis tenuis*?) hooked on a halibut trawl-line, set in 200 fathoms of water, on Sable Island Bank, off the coast of Nova Scotia. This fish (No. 21,624) is about 17 inches long and in a dilapidated condition, having been partially digested by its first captor. The tips of the fins, especially, are much frayed out. The measurements, however, are believed to be very nearly exact.

Argentina syrtensium, sp. nov.

Description.—Body compressed, resembling in form that of *Silus Ascanii* Reinhardt (= *Argentina silus* (Asc.) Nillson); its height contained about $5\frac{1}{3}$ times in its length without caudal, and slightly greater than twice the diameter of the orbit; its greatest width one-tenth of total length; its height at ventrals contained about $5\frac{3}{4}$ times in the same and equal to thrice least height of body at the caudal peduncle.

Length of head slightly less than twice its greatest height, and slightly more than one-fourth of the length of the body; its greatest width is twice that of the interorbital area. The length of the snout equals that of the operculum, is slightly greater than that of the maxillary, and is contained not quite $3\frac{1}{2}$ times in the length of the head.

The first dorsal fin is inserted midway between snout-tip and adipose dorsal fin; its basal length equal to the height of its first ray, and slightly more than half that of the longest ray; it is also equal to the orbital diameter and the length of the mandible; the last dorsal ray is slightly longer than the height of the caudal peduncle.

The adipose dorsal fin is inserted in the perpendicular from the seventh anal ray; its basal length, which is two-thirds of its height, being about equal to one-tenth of the length of the head.

The anal fin is inserted in the perpendicular from the 44th or 45th scale of the lateral line, its length of base slightly greater than length of the mandible, its first ray one-third as long as its third ray, its last ray equalling in height the adipose dorsal.

The caudal is deeply forked, its external ray $2\frac{1}{2}$ times as long as its median rays.

The pectoral is inserted close to the branchial opening; its length is equal to three-fifths of the distance of its insertion from the snout-tip,

extending posteriorly to about the twelfth scale of the lateral line and more than half way to the origin of the ventrals.

The ventral is inserted midway between the snout-tip and the insertion of the caudal fin, and in the perpendicular from the posterior dorsal ray; its length equals half the distance from the origin of the pectoral to that of the ventral.

Radial formula—B. VI; D. 12; A. 13; C. 13, 18, 12; P. 18; V. II, 12.

Scales.— $3\frac{1}{2}$, 60, 4. The scales are cycloid, with the posterior edge emarginate, the exposed surface covered with minute asperities; as in some, and perhaps all other members of this group, single rows of scales saddle the dorsal and the abdominal ridges of the body. The scales are very large: one from the abdominal row, directly behind the ventrals, measuring $6\frac{1}{2} \times 4\frac{1}{2}$; one from the lateral line, $5\frac{1}{2} \times 3\frac{1}{4}$, the unit of measurement being the hundredth of body-length. One of the scales of the lateral line, detached, is broad enough to cover the exposed surfaces of five others in the same line.

Color.—The color is considerably obliterated, but appears to have been similar to that of the common smelt (*Osmerus mordax*), with perhaps more of a metallic lustre.

The species, according to Mr. Newcomb, has a cucumber-like smell, resembling that of the smelt.

Table of Measurements.

Current number of specimen	21,624.	
	Sable Island Bank. Stomach of Hake.	
Locality	Millim.	100ths.
Extreme length without caudal	382	
Length to end of middle caudal rays	408	
Body:		
Greatest height		19
Greatest width		10
Height at ventrals		17.5
Least height of tail		5.75
Length of caudal peduncle		
Head:		
Greatest length		26
Greatest height		
Greatest width		10
Width of interorbital area		5
Length of snout		7
Length of operculum		7
Length of maxillary		6 $\frac{1}{2}$
Length of mandible		9
Diameter of orbit		9
Dorsal (first):		
Distance from snout		43
Length of base		9
Length of longest ray		17
Length of first ray		9
Length of second ray		15 $\frac{1}{2}$
Length of last ray		6.3
Dorsal (soft):		
Length of base		2 $\frac{1}{2}$
Distance from snout		85
Anal:		
Distance from snout		83
Length of base		9 $\frac{1}{2}$
Length of first ray		3
Length of longest ray		9
Length of last ray		2.66

Table of Measurements—Continued.

	Millim.	100ths.
Caudal:		
Length of middle rays		7
Length of external rays		17
Pectoral		
Distance from snout		25
Length		ca. 15½
Ventral:		
Distance from snout		50
Length		ca. 12
Branchiostegals	VI	
Dorsal	12	
Anal	13	
Caudal	XIII, 18, XII	
Pectoral	18	
Ventral	II, 12	
Number of scales in lateral line	ca. 60	
Number of transverse rows above lateral line	ca. 3½	
Number of transverse rows below lateral line	ca. 4	

WASHINGTON, November 23, 1878.

**ON THE OCCURRENCE OF THE OCEANIC BONITO, *ORCYNUS PELAMYS*,
(LINNÉ) POEY, IN VINEYARD SOUND, MASSACHUSETTS.**

By VINAL N. EDWARDS.

Mr. P. Stewart has caught between 80 and 100 of them in his pound* in about three weeks. He caught 52 one morning. In Luce's pound* they have caught between 60 and 70. They catch them with a northerly wind; none with the wind off shore. They will not live long in the pound, but will run themselves to death, and their brilliant blue color all fades out as soon as they are dead.

WOOD'S HOLL, MASS., October 1, 1878.

NOTES ON THE WESTERN GIZZARD SHAD, *Dorosoma cepedianum heterurum*, (RAF.) JORDAN.

By SAMUEL WILMOT.

SIR: I send you by post a small fish taken by one of our fishermen at Sarnia on Lake Huron. It was sent to me by one of our officers, with a request that I should let him know what sort of fish it was. It seems they think it to be a young shad. Fish very similar in appearance to this one have been known in Lake Ontario and other of our waters for many years; I recollect them forty years ago. They were not taken numerously in those days, a few being captured at times in seines, and sometimes in gill-nets, which were set out in very deep waters in the lake for the purpose of taking salmon trout: those taken in the gill-nets would be sometimes a pound in weight; the great run of them, however,

*These pounds are in Menemsha Bight, Martha's Vineyard.

never exceeded three to six inches in length. Strange to say, however, that during the past four years these little fish have become so numerous throughout the length of Lake Ontario that millions can be taken in one haul of a seine almost anywhere along the shore of Lake Ontario during the month of June. The whole shore for a long distance out, during this time, becomes so dense with these little fish that people dip them out with their hats,—rather a novel method, but it is a fact, and given for illustration of their immense numbers: vast quantities of them die along the shore. In a few days, sometimes a fortnight, they all disappear, and we see nothing of them again till the following year, excepting an odd one that may be taken at times. They invariably run from two to six inches, seldom larger. They are not prized for food, being seldom eaten, and are not marketable. They have been called here the “Moon Eye”, as they resemble the fish spoken of by me as having been taken in the deep waters, which have always been known by that name. Again, in 1873, 1874, 1875, 1876, and this year, these little fish have been alike abounding in myriads all along the north shore of Ontario. Since that time, the trout and other predaceous fishes have become very scarce in the lake, and these “Moon Eyes” have consequently wonderfully increased in numbers, to such an extent as to spread themselves in the immense number spoken of all along the shore of the lake.

The specimen sent may not be one of these “Moon Eyes”, but the resemblance is very great.*

Professor BAIRD,

Commissioner of Fisheries, &c., Washington, D. C.

NEWCASTLE, November 23, 1877.

THE OCCURRENCE OF THE CANADA PORCUPINE IN WEST VIRGINIA.

By G. BROWN GOODE.

The National Museum has obtained from Mr. H. D. Reminger, of Washington, a living specimen of the Canada porcupine (*Erethizon dorsatus* (Linn.) F. Cuv.—var *dorsatus*), captured by him November 13, 1878, near Cranberry Summit, Preston County, West Virginia. This locality is in or near lat. $39\frac{1}{2}$ N., and this is believed to be the most southern occurrence of the species. The inhabitants of Cranberry have never before known of the occurrence of porcupines in that region.

DeKay stated† that the species ranged south to the northern parts of Virginia and Kentucky. Mr. Allen believes that his statement was founded on a remark of Catesby. Audubon and Bachman write:‡ “It

*The fish received from Mr. Wilnot is the Western Gizzard Shad, *Dorosoma cepedianum heterurum*, (Raf.) Jordan.

†Nat. Hist. N. Y. 1842, 1, p. 79.

‡Quadrupeds of N. America, 1, 1846, p. 286.

does not exist in the southern parts of New York or Pennsylvania. DeKay states that it is found in the northern parts of Virginia and Kentucky. We, however, sought for it without success in the mountains of Virginia, and could never hear of its existence in Kentucky."

Professor Baird states* that the species is found as far south as Northern Pennsylvania in some localities, in which State it is not rare even now.

Mr. J. A. Allen, the most recent writer on the porcupines, remarks,† that Professor Shaler had failed to hear of the species in Kentucky and Virginia. He was informed by Dr. J. M. Wheaton that a few porcupines still survive in Clark, Champaign, and Ross Counties, Ohio, and that it was common ten years since in Putnam County; and by Mr. E. W. Nelson that the species was formerly rather common, though never abundant, in all of the wooded region north of the Ohio River, but that it is not now found (west of Ohio) south of the forests of Northern Wisconsin and Northern Michigan.

DECEMBER 12, 1878.

**CATALOGUE OF THE BIRDS OF GRENADA, FROM A COLLECTION
MADE BY MR. FRED. A. OBER FOR THE SMITHSONIAN INSTITUTION,
INCLUDING OTHERS SEEN BY HIM, BUT NOT OBTAINED.**

By GEORGE N. LAWRENCE.

In my Catalogue of the Birds of St. Vincent, I stated that Mr. Ober expected to leave that island for Grenada on the 29th of February. He must have left about that time, as some of his notes from Grenada are dated early in March. His collection from there was received at the Smithsonian Institution on the 22d of May, and sent to me a few days after. It consists of but 66 specimens.

In the following communication from Mr. Ober, he gives the geographical position of the island, with other matters of interest.

Under most of the species found there, are his notes of their habits, etc.

His communications are marked with inverted commas.

"Grenada, the southernmost of the volcanic islands, lies just north of the 12th degree of latitude north of the equator, that parallel just touching its southern point.

"It is about $18\frac{1}{2}$ miles in length, from N. N. E. to S. S. W., and $7\frac{1}{2}$ miles in breadth.

"From Kingston, the principal town in St. Vincent, to St. Georges, that of Grenada, the distance is 75 miles; from the southern end of St. Vincent to the northern point of Grenada the distance is 60 miles; the intervening space being occupied by the Grenadines.

* Mammals of North America, 1859, p. 568.

† Monographs of North American Rodentia, by Elliott Cones and Joel Asaph Allen, 1877, p. 393.

"It is very rugged, the interior of the island being one mountain chain with its offsets, and there is a less area of fertile land than in St. Vincent. The valleys that make up from the coast, and the levels lying between the hills and some portions of the coast, however, are very fertile. It is not a promising island for ornithological research, though at first glance it would seem to be able to afford rich reward.

"The mountains in the interior are volcanic; there are several extinct craters, in the largest of which is an attractive lake, 2,000 feet above the sea; it is $2\frac{1}{2}$ miles in circumference and has an average depth of 14 feet. St. Georges, the only port of any size, lies on the southwestern coast, and is highly picturesque in location, but not so attractive in the eyes of an ornithologist as it might be; the surrounding hills are rocky, and those not rocky are cultivated, so that they are inhabited by very few birds.

"Across the bay from the town, on the borders of the 'lagoon,' which is fringed with mangroves, may be found a few water birds, and in the sloping pastures at the foot of the high hills a small variety of the smaller birds.

"The southern point, Point Saline, is an excellent place for the migratory birds: plover, duck, etc., which visit this island in quantities, and some points on the eastern coast are equally good.

"I spent two weeks in and near St. Georges and St. Davids, and two weeks in the mountains and on the eastern coast.

"As this island is so near the South American continent, being but 100 miles from Trinidad and 70 miles from Tobago, I expected to find some forms of animal life different from those in the northern islands among the resident species. But with the exception of now and then a straggler being blown to these shores, there is no species (if we may except two) that would indicate proximity to a great tropical country.

"Some species common in the northern islands, from Guadeloupe to St. Vincent, have disappeared, and in one or two cases their places taken by others; notably is this the case in the instance of *Eulampis jugularis* being replaced by *Glaucis hirsutus*.

"There is no parrot as in St. Vincent, and the two species of thrush, locally known as the 'grives'—*Margarops densirostris* and *M. montanus*—do not exist here. Other minor differences occur, which will be apparent upon examining the catalogue.

"The most interesting fact regarding the higher order of animal life, is the existence here of an armadillo, once common in all the Lesser Antilles, but now extinct in all the northern islands.

"A species of monkey also lives in the deep forests of the mountains; a skin of one has been sent to the Museum.

"The most interesting portion is undoubtedly that of the mountains immediately adjacent to the mountain lake; but, if it were possible for a naturalist to spend an entire year in the island, doubtless the more southern portion would reward him better in species: for the season of

migration would probably bring many stragglers from the continent, that do not make a longer stay than a few days.

"It is only a matter of regret with me that I could not give the requisite time to this island during the 'winter months'. I am satisfied, however, that the few resident species are now fully known.

"FREDERICK A. OBER.

"My thanks are due to Wm. Sharpe, Esq., Wm. Simmons, Esq., Dr. Wells, Canon Bond of St. Andrews and John Grant Wells, Esq., for courtesies shown me."

Fam. TURDIDÆ.

1. *Turdus nigrirostris* Lawr.

"Thrush ('Grive').

"Length, ♂, 9 in.; alar extent, $15\frac{1}{4}$; wing, 5.

"Length, ♀, 9 in.; alar extent, $14\frac{1}{2}$; wing, $4\frac{3}{4}$.

"In the deep woods one may be startled by a low note of alarm from this bird, like the single cluck of the Mocking-bird of the Southern States. Searching carefully, you may discover the author of it sitting upon a low tree, with head protruded, eagerly examining the surroundings for the cause of the noise your coming makes. Discovering you, it hastily makes off, with a parting cluck. Its song is often heard in the high woods, strange notes, 'fee-ow, fee-oo,' etc., often repeated. Another cry it has when alighting and unexpectedly discovering your presence, similar to the cry of the Robin as heard at evening time in spring—a harsh cry mingled with softer notes. I have only found it in the high forests. It must be well along in the nesting period, judging from the condition of those dissected."

I was much pleased to find four specimens of this species in the collection, as but one was obtained in St. Vincent, and that had the plumage somewhat soiled. These are in good condition and more mature: they have the color of the throat as originally described, *i. e.*, the feathers of a dull white, with shaft-stripes of brown; there are no rufous terminations to the wing-coverts, as in the St. Vincent specimen; and the irregular rufous-brown markings on the upper part of the breast, as seen in that, are only just perceptible in two of the specimens: they have the breast and flanks of a darker shade of brown: the bills of these are not so dark throughout as in the type—shading into brown on their terminal halves: this difference of color is doubtless attributable to age.

2. *Turdus caribæus*, Lawr. Ann. N. Y. Acad. of Sci. vol. 1, p. 160.

"Thrush.

"Length, $9\frac{1}{4}$ in.; alar extent, $15\frac{1}{4}$; wing, 5.

"Iris wine-red; naked skin around the eye, $\frac{3}{8}$ inch wide, yellow; beak olive-green, tipped with yellow. I am positive that I heard this bird in St. Vincent, but only once, and did not obtain, or even fairly see it. Its cry is peculiar, and once heard could not be mistaken. It resem-

bles the cry of the Whippoorwill in the morning, just as it utters the 'poor-will', and just preceding the final cluck. It was not a stretch of the imagination, either, to fancy a cry like '*how de dew*' (as uttered by the country gentleman when saluting an acquaintance), with the stress upon *dew*. It has also, when alarmed or when threading a strange thicket, the soft call-note of the Thrushes, similar to that of the *grive* or Mountain Thrush. It inhabits the thick growth of old pastures, and seems to prefer the dark recesses beneath the overhanging trees and bushes of the hillsides on the borders of the opens."

3. *Mimus gilvus*, Vieill.

"Mocking-bird.

"Length, ♂, 9½ in.; alar extent, 14; wing, 4½.

"Rather plentifully distributed on the hills sloping seaward; found also well up the sides of the mountains, but not in the high woods, nor far away from cleared land."

Fam. TROGLODYTIDÆ.

4. *Thryothorus grenadensis*, Lawr. Ann. N. Y. Acad. of Sci. v. 1, p. 161.

"Wren; 'God-bird.'

"Length, ♂, 5 in.; alar extent, 7; wing, 2¼.

"A sprightly bird, found in houses in the country, in the forests and in the towns.

"Its song is a pleasing warble, and this, with its bright ways, make it a welcome visitor. The blacks will eat nearly every bird but this and the *corbeau*; but this, they say, 'make you dead,' for it is God's bird.

"Found an old nest in the house at Grand Etang, but the young had gone ('it make child, but he go'), I was told. They were hatched in February. A nest under the veranda now has four young, recently hatched. Going down to examine them one day, I found one of them had about four inches of a 'God's horse' ('Walking-stick') (*Phasmida*) protruding from its mouth. The nest is of dried grass, lined with feathers. Had it not been that these little beggars excited feelings of compassion in my breast, I would have added the old ones to my collection, well knowing that they would be valuable acquisitions."

Fam. SYLVICOLIDÆ.

5. *Setophaga ruticilla* (Linn.).

"Only one seen. This was shot, but lost in the thick matting of the loose leaves that covered the ground. It was near the border of the mountain lake."

Fam. VIREONIDÆ.

6. *Vireosylva calidris* var. *dominicana*, Lawr.

"*Vireosylva*.

"Length, ♂, 6 in.; alar extent, 10; wing, 3¾.

"Length, ♀, 6 in.; alar extent, $9\frac{1}{2}$; wing, $3\frac{1}{8}$.

"Through the woods came a strangely familiar note, 'peow, peow'. The bird I could not discover at first, but thought I detected a note akin, and was confirmed that it was an old acquaintance of Dominica and St. Vincent, when I had it in my hand. Not very abundant."

Fam. HIRUNDINIDÆ.

7. *Progne dominicensis* (Gm.)?

"*Progne*.

"One species seen, but never within shot; to all appearance, it was identical with that obtained in St. Vincent."

Fam. CÆREBIDÆ.

8. *Certhiola atrata*, Lawr.

"*Certhiola*. Scarce. Resident.

"Length, ♂, $4\frac{1}{4}$ in.; alar extent, $7\frac{3}{4}$; wing, $2\frac{3}{4}$.

"This bird is not found in great numbers, as in some of the northern islands; indeed, I have seen it but twice—on the mangrove flats of Point Saline, where its habits were in great contrast to those of its northern congeners, being shy and retired, while in other islands bold and obtrusive."

Fam. TANAGRIDÆ.

9. *Euphonia flavifrons* (Sparml.).

"Louis d'Or. Rare. Resident.

"Length, 5 in.; alar extent, $8\frac{1}{4}$; wing, $2\frac{1}{2}$.

"I have not seen this bird here alive. These specimens were shot by A. B. Wells, Esq., of St. Davids. It is not easily discovered, more from its rarity than from its shyness. Frequents the skirts of woods and nutmeg groves."

10. *Calliste versicolor*, Lawr.

"Sour-sop Bird. Abundant. Resident.

"Length, ♂, $6\frac{1}{8}$ in.; alar extent, $9\frac{1}{4}$; wing, 3.

"Length, ♀, 6 in.; alar extent, $9\frac{1}{4}$; wing, $3\frac{1}{8}$.

"Though in St. Vincent I saw the bird only in small numbers and solely in the mountains, here it is everywhere. The same chattering cry, noisy in feeding, calling one to another, gregarious, is greedy in its search for food, a flock of from 8–12 may be seen swarming over a small tree or bush. It is very partial to the seed of the Sour-sop, which gives it its local appellation. It is now nesting."

Fam. FRINGILLIDÆ.

11. *Loxigilla noctis* (Linn.).

"Length, ♂, $5\frac{1}{4}$ in.; alar extent, $8\frac{1}{2}$; wing, $2\frac{3}{4}$.

"Length, ♀, $5\frac{1}{8}$ in.; alar extent, $8\frac{3}{4}$; wing, $2\frac{3}{4}$.

"One of the most common birds, second only to the small 'grass bird' (*Phonipara bicolor*)."

12. *Phonipara bicolor* (Linn.).

"*Phonipara bicolor*. 'Si Si Zerbe.'

"Everywhere abundant, so common in fact that, thinking I could obtain it at any time, I devoted my attention to other rarer birds, and finally left without a specimen."

Fam. ICTERIDÆ.

13. *Quiscalus luminosus*, Lawr. Ann. N. Y. Acad. of Sci. v. 1, p. 162.

"Blackbird. Resident.

"Length, ♂, $10\frac{1}{4}$ in.; alar extent, $15\frac{1}{4}$; wing, 5.

"Length, ♀, $9\frac{3}{4}$ in.; alar extent, 14; wing, $4\frac{3}{4}$.

"This bird first occurs in the Grenadines. It has seldom been seen in St. Vincent, although abundant on the small islands of Balliceaux and Bequia. The latter is not ten miles distant. It is there called the 'Bequia Sweet', from its notes: 'Bequia sweet, sweet.'

"It is social, gregarious, seeming to delight in company, spending a great part of the day in sportive play. The first I saw were in Balliceaux, one of the northernmost of the Grenadines. I was struck with the similarity of a habit of theirs to one of the Boat-tailed Grackle of Florida and the South, as I had observed it on the banks of the St. John's River. A party of them had come down to drink at a small pool in one of the pastures. After drinking, each male would lift its beak perpendicularly, spread out its wings and one leg, and give utterance to a joyous cry, as though giving thanks for the enjoyment afforded by the drink. Then the whole crew would join in a general outburst, both females and males. Then they would adjourn to a near fence rail, and keep up a social conversation, stretching their legs and wings and showing their glossy feathers to the sun. The air would then resound with the cries, said by the islanders to be, 'Bequia sweet, sweet, sweet.' That was in February. Though I then expected to get them to send home with the St. Vincent collection, I was disappointed, as our boat was smashed on a neighboring rock next day, and we were picked up and carried to St. Vincent without an opportunity for getting the birds.

"In Grenada I found them in abundance again, flying in flocks and inhabiting exclusively the lowlands, the swamps and borders of the lagoons. It is easily attracted by unusual sounds, as I once proved while hunting Yellow-crowned Night Herons in a swamp on the eastern coast, by calling around me not less than forty, who filled the bushes and trees around and above me, staying a long while.

"Think it is exclusively confined to Grenada and the Grenadines."

Fam. TYRANNIDÆ.

14. *Elainea martinica* (Linn.).

"Flycatcher. Resident. Rather numerous.

"Length, ♂, $7\frac{3}{8}$ in.; alar extent, 11; wing, $3\frac{5}{8}$.

"Length, ♀, $6\frac{5}{8}$ in.; alar extent, $10\frac{1}{2}$; wing, $3\frac{1}{2}$.

15. *Myiarchus oberi*, Lawr.

"Flycatcher. Not abundant.

"Length, ♂, 9 in.; alar extent, 13; wing, $4\frac{1}{8}$.

"Length, ♀, $8\frac{3}{4}$; alar extent, $12\frac{1}{2}$; wing, 4.

16. *Tyrannus rostratus*, Sch.

"*T. rostratus*. Resident. Abundantly distributed.

"Length, ♂, 10 in.; alar extent, $15\frac{3}{4}$; wing, 5.

"Length, ♀, 9 in.; alar extent, $14\frac{3}{4}$; wing, $4\frac{3}{4}$.

"Occurring at all altitudes, but preferring the lowlands, open fields, and hills. Delights in a shrub with bare protruding prongs, or an open-foliaged tree like the trumpet tree and bread fruit. Its cry is a shrill 'piperee, piperee'; hence its name. Especially partial to the tall cabbage palm (palmistes), making its home in the fronds, and darting thence upon any passing insect.

"More abundant in Antigua than elsewhere. Its large flat bill, the concealed flushes of yellow beneath the wings, and the beautiful silken feathers of saffron and crimson concealed in the crown, make it an interesting specimen in the hand, though it is a very ordinary looking bird as seen in activity."

17. *Tyrannus melancholicus*, Vieill.

"*Tyrannus* ———. The first seen.

"Length, ♂, 9 in.; alar extent, $14\frac{1}{2}$; wing, $4\frac{3}{4}$.

"The first bird of this species shot seemed fatigued from a long flight, and I thought it must have come from another island, Tobago or Trinidad. It has never been seen by those who observe the birds of the island. I still think it a straggler from Tobago."

Two specimens are in the collection. This and the following species (*Glaucis hirsutus*) are the only South American forms that were procured, showing how strictly this and the islands north of it are defined as a distinct zoological province. In the islands to the south, viz, Tobago and Trinidad, the birds assimilate to those of the South American continent.

Fam. TROCHILIDÆ.

18. *Glaucis hirsutus* (Gm.).

"Brown Hummer. (New to me.)

"Length, ♂, $5\frac{1}{2}$ in.; alar extent, $6\frac{3}{4}$; wing, $2\frac{1}{2}$.

"Length, ♀, $5\frac{1}{4}$ in.; alar extent, $6\frac{1}{2}$; wing, $2\frac{1}{2}$.

"This species entirely replaces the Garnet-throat (*Eulampis jugularis*), of which latter I have not seen a single specimen. This one is confined to the same haunts, viz, the cool depths of the high woods, and is never seen in the valleys or below the last ring of high cliffs and forest-trees. So closely does the plumage of this hummer assimilate with the color of the fallen leaves, dry as well as green, that I lost my first specimen and found the others only by long search."

19. *Eulampis holosericeus* (Linn.).

"Green-throat. 'Colibri.' Scarce.

"Length, ♀, 5 in.; alar extent, $6\frac{1}{2}$; wing, $2\frac{1}{2}$.

"Feeding from the crimson flowers of a huge cactus, I saw this humming-bird this morning, in a hedge row bordering the road to St. Davids. It does not occur in the abundance that I find of the small crested hummer, and I have not seen it in the mountains."

20. *Orthorhynchus cristatus* (Linn.).

"*O. exilis*? March 16th.

"Length, ♂, $3\frac{5}{8}$ in.; alar extent, 5; wing, 2.

"The crest seems brighter and deeper than in those of Dominica and St. Vincent. It is distributed profusely throughout high woods, hills, upper valleys, and sea-coast; everywhere I see its glancing crest, hear the whirring of its wings. Just a year ago I found a nest in Dominica; here in the mountains they have not yet built their nests, though it is possible they may have commenced in the lowlands. They are in the thickets between the Grand Etang and the deep woods, visiting the different flowers so frequently that it seems to me they must be exhausted of sweets and insects."

Fam. CYPSELIDÆ.

21. *Chætura* sp.?

"I was unfortunate with this bird, never getting one within range. It is of the same shape, size, and color of the species obtained in Dominica. Only one species seen."

Fam. ALCEDINIDÆ.

22. *Ceryle alcyon* (Linn.).

"Length, ♂, $12\frac{1}{2}$ in.; alar extent, $20\frac{1}{2}$; wing, $6\frac{1}{4}$.

"Though nearly a year has passed since I first saw the Kingfisher of these islands (in Dominica), this is the first island in which I have been able to shoot one. It is very shy, and somehow I have always just missed it, in Dominica as well as St. Vincent, in neither of which islands is it plentiful; and it was only by the most artful bushwhacking that I at last got this one. Not abundant; resident."

Fam. CUCULIDÆ.

23. *Coccyzus minor* (Gm.).

"'Cuckoo manioc.' Abundant; resident.

"Length, ♂, $12\frac{1}{2}$ in.; alar extent, 16; wing, $5\frac{1}{2}$.

"The harsh cry, resembling somewhat that of the Yellow-billed Cuckoo, may be heard almost any day, proceeding from the low growth of some overgrown pasture or hillside.

"Of unsuspicious demeanor, this bird will allow a near approach; if it flies, it is but for a short distance, to a low tree or thick shrub, where, if unmolested, it hops about with apparently aimless intent, though keeping a good lookout for its food, butterflies, moths, etc.

"Very common on the hillside beyond the Carenage."

24. *Crotophaga ani*, Linn.

"'Corbeau.' Abundant; resident.

"Length, ♂, 15 in.; alar extent, 17; wing, 6.

"Length, ♀, 14 in.; alar extent, 16½; wing, 5½.

"Called the 'Tick-bird' in St. Vincent; here the 'Corbeau', French for Raven. Said to have been blown over from Trinidad in a gale some years ago. It has increased wonderfully; not held in favorable repute; eats ticks, bugs, etc., but also eats corn and guinea-grass grain. The same stupid unsuspicious bird everywhere; breeds abundantly; gregarious. Where one goes and persistently calls, the rest of the flock, from 6 to 12, will surely follow. In a tree or bush they cluster close together; have a squeaking cry.

"They build a large loose nest, and lay in it eggs of a greenish color. A curious habit of theirs is to build a second nest upon one already filled with eggs. The only nest I have examined had not a full complement of eggs, and I cannot tell just what number they lay."

Fam. STRIGIDÆ.

25. *Strix flammea* var. *nigrescens*, Lawr.

"Owl; 'Jumbie Bird.' Rare.

"Length, ♂, 12 in.; alar extent, 30½; wing, 10.

"In different parts of the island are the towers of ancient wind-mills, which, in various stages of ruin and dilapidation, are going to decay. Being made of stone, and generally covered with ivy and running vines, without roof and full of holes, they offer excellent places of abode for the owls, and there is rarely a ruin without its occupant to frighten the negroes to the verge of insanity with its nocturnal hootings. From a superstitious dread of the 'Jumbie bird,' and from the fact that these old mills are well hung with the nests of 'Jaek Spaniard'—a wasp, it is difficult to get a negro to climb into a tower to dislodge the owl.

"I am indebted for this one to Mr. Goddard, the manager of the Estate of Clarke's Court."

Fam. FALCONIDÆ.

26. *Pandion haliaetus* (Linn.).

"An infrequent winter visitor on the east or Atlantic coast."

27. *Buteo pennsylvanicus* (Wils.).

"Length, ♀, 15½ in.; alar extent, 35; wing, 11. •

"At this time (March 25) it is engaged in incubation. Not abundant; resident."

28. *Tinnunculus sparverius* var. *antillarum* (Gm.).

"Very rare, and, so far as I can ascertain, confined to the eastern coast."

Fam. FREGATIDÆ.

29. *Fregata aquila* (Linn.).

"Breeds on the rocks north and northeast of Grenada, sparingly, but in increased numbers on some of the smaller Grenadines."

Fam. PHÆTHONIDÆ.

30. *Phæthon æthereus*, Linn.

"Cannot tell if it breeds in Grenada, but am of the opinion that it does. The specimens obtained in the northern Grenadines were included in the St. Vincent catalogue."

Fam. PELECANIDÆ.

31. *Pelecanus fuscus* (Linn.).

"Breeds on the rocks north of Grenada as well as throughout the Grenadines."

32. *Sula fiber* (Linn.).

"Inhabits the rocks off the northern coast. Most plentiful in the Grenadines."

Fam. ARDEIDÆ.

33. *Ardea herodias*, Linn.

"Extremely wild. I have seen it on different occasions, and in the different islands in different months, and pronounce it a straggling resident (if this term be allowable), that is, one or two may remain after the spring migrations and may breed, though I have heard of no authentic instance of its breeding."

34. *Garzetta candidissima* (Gm.).

"'Gaulin blanc'."

"Length, 23 in.; alar extent, 37; wing, 11."

"The abundance of this species is in striking contrast to its scarcity in St. Vincent. This may be attributed to the increased extent of low wet land, swamps, and lagoons."

"Only Antigua exceeds this island in the number of this species. As in Dominica and the other French-speaking islands, it is called the 'Gaulin blanc', and the heron in the blue plumage 'Gaulin noir' or 'bleu'. This is second in point of numbers of the herons, the 'Gaulin bleu' third, and the yellow-crowned fourth. The *B. virescens* is the most numerous of the whole. It breeds in the mangroves bordering the lagoon later in the season."

35. *Florida cærulea* (Linn.).

"It is not so common as the 'Gaulin blanc' and exceedingly shy."

36. *Butorides virescens* (Linn.).

"Length, ♂, 18 in.; alar extent, 25; wing, 7.

"As my boat skirted the fringe of mangroves bordering the lagoon across the bay from St. Georges, it ousted numbers of this small species. They would fly a little ways, then dive into the deep foliage of the mangroves, where a very close inspection might detect it crawling among the spider-like roots, or threading its way through the mesh-work of aerial suckers seeking the mud. When started by the boat or gun, it gave utterance to its guttural cry, and as we moved along, the crackling and shutting of oyster shells accompanied us throughout."

37. *Nyctiardea violacea* (Linn.).

"A very shy and cautious bird, inhabiting the swamps near the sea-coast. I have at different times waited for hours for a shot at it in the deep mangroves, which it loves to frequent."

Fam. PLATALEIDÆ.

38. *Platalea ajaja* (Linn.).

"A very rare migrant, said to have been seen here."

Fam. COLUMBIDÆ.

39. *Columba corensis*, Gm.

"'Ramier.'

"Length, ♂, 16 in.; alar extent, 26½; wing, 9.

"I arrived at the Grand Etang, the lake in the mountains, about noon; within an hour, the only man living there started with me around the lake. After walking half an hour or so, we reached comparatively open woods, the trees thick and very high. We heard a pigeon coo, and after some time found him perched on the topmost branch of a tall 'figuer' tree, so high up that I at first mistook him for a 'grive'. At the report of my gun, he started wildly, flew a few yards upward, and then fell hurtling through the air, striking the ground with a thud. His crop was full of hard seeds, large as small bullets. They seem to be in these woods in good numbers."

"They are now (March 12th) mating. In November, December, and January, they visit the islands off the coast in great numbers, and are said even to extend their flight to Tobago, in which latter island they are not resident."

40. *Zenaida martinicana*, Bp.

"'Tourterelle.' Not plentiful.

"Length, ♂, 11½ in.; alar extent, 18; wing, 6¼.

"Length, ♀, 11 in.; alar extent, 17; wing, 6.

"In the mangroves bordering the bay of 'Clarke's Court' estate, near the southern end of the island, I found this dove. It was near noon of a very hot day, as the manager and another friend accompanied me into

the deep shade of the 'mang' (as it was called), where the mud was half knee-deep, and stagnant pools crossed the surface. At that time the doves came in from the surrounding hills for the shade, and we did very well with them and the Ground Doves, as a dish of them at dinner amply testified. It is abundant outside of these mangrove swamps; it prefers the vicinage of the sea-coast."

41. *Chamæpelia passerina* (Linn.).

"Ground Dove.' Abundant; resident.

"Length. ♂, $6\frac{1}{2}$ in.; alar extent, 10; wing, $3\frac{1}{4}$.

"Length. ♀, $6\frac{1}{2}$ in.; alar extent, 9; wing, $3\frac{1}{2}$.

"Among all the dry hills about St. George's this little dove can be seen and heard. It frequents the pastures, the cane-fields, and, in the heat of the day, the mangroves for shade. Equally abundant on the east coast."

42. *Geotrygon montana* (Linn.).

"Perdix."

"I saw several of this species in the forest around the Grand Etang, and shot a fine female, which was unfortunately lost. By some strange mischance, I did not finally succeed in securing any specimens.

"They are exactly the same in size and coloring as those of Dominica and St. Vincent. I discovered two nests, each containing two eggs. They choose strange places for their nests, generally placing them upon some great parasite, attached to a small tree, 4-6 feet from the ground. Upon a slight covering of leaves they lay two coffee-colored eggs; the season for incubation is March and April."

Fam. RALLIDÆ.

43. *Gallinula galeata* (Licht.).

"Gallinule. Not common; resident.

"Length. ♀, $14\frac{1}{2}$ in.; alar extent, 21; wing, 7."

44. *Porzana*?

45. *Fulica*?

"This was described as occurring in the volcanic lake near the north coast; also the preceding species."

Fam. CHARADRIIDÆ.

46. *Charadrius virginicus*, Borkh.

"At time of migration."

Fam. SCOLOPACIDÆ.

47. *Tringoides macularius* (Linn.).

"Sandpiper.

"Length. ♂, $7\frac{1}{2}$ in.; alar extent, $12\frac{1}{2}$; wing, $4\frac{1}{2}$.

"Shot on the east coast; frequents the coast and rivers in small numbers and seems to be a resident."

48. *Numenius hudsonicus* (Lath.)?

"At time of migration."

Fam. LARIDÆ.

49. *Anous stolidus* (Linn.).

"The Noddy Tern."

50. *Sterna maxima*, Bodd.

"*S. cayenensis*."

51. *Sterna dougalli*, Mont.

52. *Sterna fuliginosa*, Gm.

53. *Larus atricilla*, Linn.

"This and the preceding four species of tern breed in the smaller of the Grenadines, principally upon the southern coast."

Fam. PODICIPITIDÆ.

54. *Podiceps*?

"*Podiceps*."

"Not seen by me, but described with sufficient accuracy to identify it as a *Podiceps*."

"It was greatly my desire to visit the curious volcanic lake, near the northeastern coast, which is said to be well supplied with water-fowl. Strange as it may seem, in an island black with negroes, I could get no one to transport my necessary equipments, nor could I get a horse to carry me until too late for the purpose."

"The Grenadines!

"Consist of small islets and rocks forming a chain between St. Vincent on the north and Grenada on the south. Unlike the other islands, they are not volcanic, have little elevation, no running streams, and are rather barren.

"Bequia, Mustique, Cannouan, and Carriacou are the largest, and some portions of these islands are cultivated. The inhabitants subsist principally upon fish. Some cotton is raised; also sugar.

"From their conformation and from their barrenness it will be readily seen that the birds characteristic of the larger islands cannot be found here. The Ground Dove (*Chamaepelia passerina*) and the Turtle Dove (*Zenaida martinicana*) are very abundant, as the low scrub, with which a great part of the islands are covered, afford them protection and food, while the shallow water-holes give them the little necessary drink.

"The Blackbird (*Quiscalus luminosus*) is very abundant. The Cuckoo manioc (*Coccyzus minor*) is also found here, as well as the *Certhiola* sp.?, the small Sparrow (*Phonipara bicolor*), the Mocking-bird (*Mimus gilvus*), the Green Heron (*Butorides virescens*), and the Chicken Hawk (*Buteo pennsylvanicus*). In one of the islands, Union, the Cockrico (*Ortalia ruficauda*) has been successfully introduced, and some attempts have been made with the American Quail (*Ortyx virginianus*). Some of the islands are in private hands, and have been stocked with deer and goats, which, having become thoroughly wild, afford excellent hunting.

"The sea birds frequent the small islands, and the outlying rocks of the larger, in myriads, where they breed.

"The Little Crested Humming-bird of Grenada and St. Vincent is also found in the Grenadines."

NEW YORK, December 10, 1878.

ON THE BREEDING HABITS OF THE SEA-CATFISH (ARIOPSIS MILBERTI?).

By PROF. N. T. LUPTON.

VANDERBILT UNIVERSITY,
Nashville, Tenn., February 19, 1877.

Prof. SPENCER F. BAIRD:

About the middle of July, 1868, while on a visit to Mobile, Ala., I accompanied a party of friends on a fishing excursion to Fish River, a small stream on the eastern side of Mobile Bay, some 25 miles below the city. This river near its mouth widens out, forming Berwicks Bay, a sheet of water about three miles wide by four in length. This Berwicks Bay is a favorite fishing-ground, being the resort, especially after a storm in the Gulf, of immense schools of mullet. A great variety of other fish, such as the croaker, trout, redfish, &c., abound in this bay.

Captain Wemyss, who owned a large saw-mill on the bank of the river, and whose hospitality we were enjoying, kindly proposed to show us the different kinds of fish which frequent these waters, and to this end furnished a large seine and the necessary force to draw it.

While examining the fish my attention was called to several cat, each about 10 inches in length, which seemed to have a wonderful development of the throat. On examination, the enlargement was found to be caused by small catfish and eggs which were carried in the mouth. From the mouth of one I took out eleven small fish, each about an inch in length, and from another eight or nine eggs the size of a small marble, the eyes of the embryonic cat showing distinctly through the thin membrane enveloping the egg.

On inquiry made of several old fishermen in the neighborhood, and of a large number elsewhere, I have failed to find one who knew anything

whatever of this habit of the catfish. If the observation is new, and it deserves to be placed on record, you are at liberty to use this in any way you may deem proper.

Very respectfully,

N. T. LUTTON.

**ON THE OCCURRENCE OF *STICHÆUS PUNCTATUS*. (FABR.) KRÖYER,
AT ST. MICHAEL'S, ALASKA.**

By TABLETON H. BEAN.

A single specimen of the species above named was collected June 29, 1874, at St. Michael's, Alaska, by Mr. Lucien M. Turner, who sent it to the United States National Museum. The species is now apparently for the first time recorded from the coast of Northwestern North America. The total length of the specimen is 145 millimetres ($5\frac{11}{16}$ inches). It has been compared with an individual of the same species from Greenland (probably from the Danish Colonies, as it was presented to the Museum by the Danish Academy), and another from Halifax, Nova Scotia, where it was taken September 4, 1877, by the United States Fish Commission, at the mouth of the harbor, in 20 fathoms of water. In order to show at a glance how the St. Michael's specimen differs from the other two, the proportions of the different parts of the body of all the specimens to the total length without caudal are exhibited in tabular form. The average proportions of the three individuals are given in another table, and they may serve as a basis of a description of the species. From this average the specimen from St. Michael's differs in the following particulars:

1. The maxillary is longer.
2. The mandible is longer.
3. The pectoral is longer.
4. The ventral is inserted somewhat nearer the snout.

In the number of anal rays, the Alaska specimen is intermediate between the other two. The differences indicated fall within the limits of individual variation, and in the absence of sufficient material it is not practicable to separate the St. Michael's example from the other two, even as a variety.

Stichæus punctatus is recorded from the coast of Greenland (Danish Colonies?), Newfoundland, Halifax, Nova Scotia, and St. Michael's, Alaska.

Table of Measurements.

Current number of specimen	21,718.		4,588.		21,068.	
Locality	{ St. Michael's, Alaska.		Greenland.		Halifax.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length (without caudal)	125		101		160	
Length to end of middle caudal rays	145	(5 $\frac{1}{16}$ in.)	117		182	
Body:						
Greatest height		17		13		16 $\frac{1}{2}$
Height at ventrals		12		12		13
Least height of tail		7		7		6
Head:						
Greatest length		22		21		22
Greatest width		10		10		9 $\frac{1}{4}$
Width of interorbital area		2 $\frac{1}{2}$		2 $\frac{1}{2}$		2
Length of snout		6		5 $\frac{3}{4}$		6
Length of upper jaw		8		6 $\frac{1}{2}$		7
Length of mandible		10		8 $\frac{1}{2}$		9
Distance from snout to centre of orbit		8		7 $\frac{1}{2}$		7 $\frac{1}{2}$
Diameter of orbit		5		5		4 $\frac{1}{2}$
Dorsal:						
Distance from snout		21		22		20 $\frac{1}{2}$
Length of base		78		80		80
Anal:						
Distance from snout		45 $\frac{1}{2}$		46		47
Length of base		54		55		54
Caudal:						
Length of middle rays		16		15 $\frac{1}{2}$		14
Pectoral:						
Distance from snout		21 $\frac{1}{2}$		22 $\frac{1}{2}$		22 $\frac{1}{2}$
Length		18		16		16 $\frac{1}{2}$
Ventral:						
Distance from snout		19		21		23
Length		7 $\frac{1}{2}$		8		6 $\frac{1}{2}$
Branchiostegals	VI		VI		VI	
Dorsal	48		50		48	
Anal	35		37		33	
Caudal	21		22			
Pectoral	15		15		15	
Ventral	3		3		3	

Table of Proportions.

Number of specimen	4,588.	21,718.	21,068.
Locality	Greenland.	St. Michael's.	Halifax.
Length of head in total length without caudal (times)	4.76	4.55	4.55
Interorbital area in total length without caudal (times) .....	.40	.40	.50
Snout in total length without caudal (times)	17.65	16.67	16.67
Upper jaw in total length without caudal (times)	15.38	12.50	14.29
Mandible in total length without caudal (times) .....	.12	.10	.11
Distance of dorsal from snout in total length without caudal (times)	4.55	4.76	4.88
Base of dorsal in total length without caudal (times)	1.25	1.28	1.25
Distance of anal from snout in total length without caudal (times)	2.17	2.20	2.13
Base of anal in total length without caudal (times)	1.82	1.85	1.85
Distance of pectoral from snout in total length without caudal (times)	4.44	4.65	4.44
Length of pectoral in total length without caudal (times)	6.25	5.55	6.06
Distance of ventral from snout in total length without caudal (times)	4.76	5.26	4.35
Length of ventral in total length without caudal (times)	12.50	13.33	15.38
Branchiostegals	VI	VI	VI
Dorsal rays	50	48	48
Anal rays	37	35	33
Caudal rays	22	21	Imperfect.
Pectoral rays	15	15	15
Ventral rays	3	3	3

AVERAGE OF THE SPECIMENS.

Length of head in total length without caudal (times)	4.62
Interorbital area in total length without caudal (times).....	43
Snout in total length without caudal (times).....	17
Upper jaw in total length without caudal (times).....	14.05
Mandible in total length without caudal (times).....	11
Distance of dorsal from snout in total length without caudal (times).....	4.73
Base of dorsal in total length without caudal (times).....	1.26
Distance of anal from snout in total length without caudal (times).....	2.17
Base of anal in total length without caudal (times)	1.84
Distance of pectoral from snout in total length without caudal (times).....	4.51
Length of pectoral in total length without caudal (times).....	5.95
Distance of ventral from snout in total length without caudal (times).....	4.79
Length of ventral in total length without caudal (times).....	13.74
Branchiostegals	VI
Dorsal rays.....	48-50
Anal rays	33-37
Caudal rays.....	21-22
Pectoral rays	15
Ventral rays	3

U. S. NATIONAL MUSEUM, Washington, December 4, 1878.

REPORT ON THE LIMPETS AND CHITONS OF THE ALASKAN AND ARCTIC REGIONS, WITH DESCRIPTIONS OF GENERA AND SPECIES BELIEVED TO BE NEW.

By W. H. DALL.

The following report has been drawn up chiefly from material collected in Alaska from 1865 to 1874 inclusive, but includes references to the few Arctic or northern species which are not common to Alaskan waters.

The northwest coast of America, which I have already stated I have reason to think is the original center of distribution for the group of *Docoglossa*, at least of the littoral forms, is unquestionably the richest field where these animals may be found. This is true not only in regard to the number of species, but also in regard to the number of peculiar and remarkable forms of genera and subgenera; in one sense, the development and specialization of the soft parts, even at the expense of the shelly envelope, is a test of relative rank in restricted groups. Hence it may not be erroneous to regard the gigantic *Cryptochiton* as representing the highest development of the group, though belonging in the section of Irregular Chitons; especially as paleontological evidence shows part of the section of Regular Chitons to represent the Chitons of paleozoic times and embryonic structure. As was pointed out in my previous paper on the phylogeny of the *Docoglossa*, the embryonic types, represented by *Lepeta* and *Cryptobranchia* among the Limpets, are represented on the N. W. coast by a larger number of species and by larger individuals than in any other region; so the embryonic types of *Chitonida* in the same district are here to be found more largely repre-

sented in species and by larger individual species than anywhere else in the world. That this is also true of other groups of Mollusca, such as the *Fissurellide*, *Trochide*, *Haliotide*, *Buccinide*, and others, I hope hereafter to be able to show conclusively.

Since I have elsewhere* treated in considerable detail the Limpets of the northwest coast of America, I shall here present only a list of the species with such additional material as six years' study and collections have brought to hand, and reserve for the Chitons a more detailed account. This is the more desirable, since this group has been very generally neglected, and even the most modern descriptions often fail to give those details by which a species can be assigned a place among its proper associates.

Had the late Dr. Carpenter survived, the report on this group would have been delegated to his more able hands; the material passed for a time into his possession, but his premature demise came to pass before anything except the identification of the already known species and some correspondence on the general subject had been accomplished. For sufficient reasons, it is not to be hoped that his materials for a monograph of the group, as a whole, will be published for some time, and I have therefore been authorized to use some extracts from his MSS. which have a direct bearing on the particular species here referred to. I have in all cases followed him in framing descriptions of species, and have quoted his original descriptions (giving due credit) where it was practicable. Research into several undecided questions has resulted in decisions in several cases different from those he had anticipated; but in which conclusions, from my intercourse with him, I have no doubt he would have eventually coincided, had he lived to follow out the investigations he began.

The caution, in assigning values to the higher divisions of this singular group, which was exercised by Dr. Carpenter, has been fully justified, and it does not seem that our knowledge of them is yet sufficiently complete to authorize definite conclusions. Examination of the radula, heretofore almost wholly neglected, emphasizes the necessity of continued caution. The numerous characters presented by the insertion-plates, the characters of the girdle, branchiæ, sexual organs, development, radula, and the presence or absence of pores on the upper surface, are apparently interchangeable to a greater extent than would be supposed. In this sense they present a remarkably homogeneous group. In spite of numerous important and peculiar features, their position, as a subdivision of the Gasteropodous Mollusca, appears to me to be definitely settled beyond any reasonable question. By very numerous characters, their continued association in the neighborhood of the Limpets as their nearest (if still somewhat distant) relatives appears to me to be assured, and requires only some knowledge of the embryology of

*"On the Limpets," &c., Am. Journ. of Conchology, vi. pp. 223-232, pl. 14-17, April, 1871.

Limpets to be placed on a definite footing. That any classification founded on single characters, or a small proportion of characters, may result unfavorably to this view, I am not prepared to deny; but whatever advantages such a method may present, it is not one which appears worthy of the name of philosophical treatment, or likely to endure as our knowledge becomes more definite and extended.

It is not yet certain how far the indications of the dentition may be relied on in this group, as will presently be shown. Whether, as in the implacental mammalia, the teeth will prove an insecure basis for generalization beyond genera, or whether a classification based upon them will present a more favorable aspect when a larger number of species have been examined, it is yet impossible to say. What is known presents some anomalies to which the key is at present wanting. So far as investigation has proceeded, greater weight seems due to the character of the shelly plates than to any other single feature, and the tentative classification of Dr. Carpenter is in this way justified. Any division of the group into families seems premature without more light. The genera and subgenera are, in most cases, reasonably sure on their foundations; but on an examination of the dentition, such as is contemplated by Dr. Troschel, and is urgently needed, much will depend. But until this has been made very full and thorough, it is to be hoped that generic distinctions based on the teeth alone may be suspended, or at least left without names.

A sketch of the outlines of Dr. Carpenter's classification will not be out of place here, but is best preceded by an explanation of certain terms used in description.

In all Chitons with exposed valves, the seven posterior valves are divided more or less plainly by lines radiating from the apex to the opposite anterior edge. The sculpture of the posterior triangular areas (*areae laterales*) thus cut off is almost uniformly like that of the whole anterior valve and the part behind the apex (*muero*) of the posterior valve. The central or anterior triangles (*areae centrales*) are sculptured alike, but generally in a different pattern from the sides. The *areae laterales* are usually raised a little above the rest. It is very rare that the bounding diagonal lines cannot be traced, and they usually correspond to the slit in the side-laminae of insertion, which project into the zone or girdle, and are free from the peculiar porous superficial layer characteristic of the exposed test in the whole group of Chitons. This superficial layer usually projects over the anterior and posterior laminae of insertion or teeth (*dentes*) in the first and last valves, forming what Dr. Carpenter terms the 'caves' (*subgrunda*). These may exhibit the spongy character of the layer of which they are formed, or may be varnished over at their edges with a thin layer of true shelly matter, as in the Ischnoid group. In the typical Chitons they are short, leaving the teeth projecting; in the Mopaloids they are hardly developed, and in some groups they quite overshadow the teeth.

In many genera there is a small portion of peculiar sculpture marked off along the ridge of the median line of the back. This is the *area jugali*, and corresponds to the *sinus* or space between the inner terminations of the two anterior *sutural laminae* which pass forward from each of the posterior seven valves under the valve in front. The *sutural laminae* are also destitute of the porous layer. The *sinus* is either open,

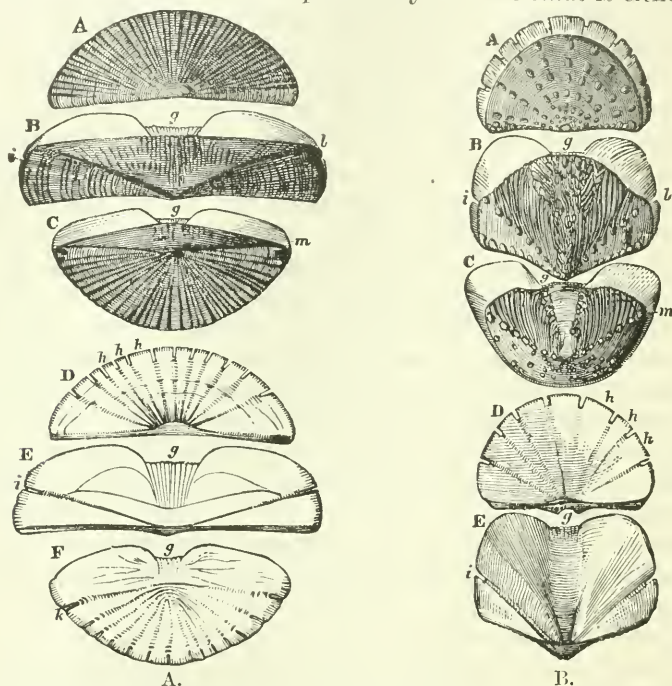


FIG. A.—*Chiton olivaceus* Sowerby. *A*, anterior, *B*, middle, and *C*, posterior valve, seen from outside; *D*, *E*, *F*, the same valves, from within; *g*, *sinus jugali*, between the two anterior sutural laminae; *h*, *h*, *dentes*, or teeth between the notches or slits in the laminae of insertion; *i*, *k*, slits in lamina of insertion; *l*, outer end of line separating the *area lateralis* of the middle valve from the *area centralis*; *m*, end of the line separating the central area of the tail-plate from the posterior portion: the angulation of this line in the median line of the animal forms the *macro*.

FIG. B.—*Enoplochiton niger* Barnes.—*A*, anterior valve from above, showing the laminae of insertion and notches; *B*, the middle valve, from above: *g*, *sinus jugali*, in front of the jugum, or *area jugali*, and between the two sutural laminae; *i*, *l*, notches between the sutural and insertional laminae, and forming the ends of the line forming the anterior border of the lateral and posterior border of the central areas; *C*, tail-plate; *g*, *sinus jugali*; *m*, end of line separating the areas; *D*, anterior valve, from within, showing teeth (*h*, *h*) and notches of lamina of insertion; *E*, middle valve, from within; *g*, jugal sinus, between the sutural laminae; *i*, notch, between sutural lamina and side-lamina of insertion.

or part of the jugular area projects forward between the sutural laminae, forming a false apex; or a keystone-like piece, either solid, or fimbriated like the teeth of a comb, may exist between the laminae and partly fill the sinus. The *sinus posticus* is the wave, notch, or indentation which in some genera is found in the posterior edge of the posterior valve. In

some of the Irregular Chitons, *posterior sutural laminae* are found, but these are very exceptional.

In the vast majority of genera, the side-laminae of insertion have only one slit on each side of the valve; occasionally a valve may be abnormal in a regular species, and the number of slits in the anterior and posterior valves may vary within moderate limits.

The girdle (*zona*), which is distinct from the true mantle, is variously ornamented with scales, bristles, spines, down, or hairs, either singly or combined, which exhibit most beautiful forms tolerably constant in generic groups, and worthy of a special and exhaustive research.* These may be solid or hollow, shelly or keratose, single or combined in bunches, and in some forms are hollow and annulated, precisely like the setæ of Brachiopods. In certain genera they issue from pores, usually at the sutures, and these pores have a certain value as a systematic character, but much less than has been assigned to them by some authors.

The Chitons in the adult condition are destitute of eyes or tentacles, and exhibit evidences of degradation anteriorly. The anus is always median and posterior; on each side of it are the sexual openings or *fenestrae*. These may open by several slits or pores directly into the perivisceral cavity, or form the aperture of a sexual duct. The gills, as pointed out by me in 1871, are composed of a row of branchiæ, starting from near the tail, extending a third (*posticae*), half (*mediae*), or all the way (*ambientes*) toward the head, each leaflet of which corresponds to a whole branchial plume, such as is found in *Acmæa*. Each single gill is conical, with the lamellæ projecting inward, somewhat resembling in outline the shell of *Carinaria*. The mantle, inside the coriaceous margin of the girdle, often forms a lamina or fringe. A lappet called the 'veil' generally surrounds the front of the rostrum, which has sometimes a double veil. The muzzle is semicircular, usually plain, and exhibits a tendency to form a lobe at the two posterior corners. The radula is always present. Like the Limpets, Chitons possess a laminated crop before the true stomach. The nervous system, beautifully worked out by Brandt† in a paper singularly overlooked by most writers, is also comparable with that of *Patella vulgata* (simultaneously examined and figured), though by no means identical. The cephalic ganglia appear to be suppressed, forming another evidence of the degeneration or want of developement of the cephalic region in this group. A valuable paper by Dr. H. von Ihering of Erlangen, I have not yet had access to, but understand that it contains a description of the nervous system of Chitons.‡

*Cf. Reineke, Beitr. zur Bildungsges. der Stacheln, u. s. w.; Zeitschr. für Wiss. Zool. 1858.

†St. Petersb. Imp. Acad. Sci. Mélanges Biolog. vii, p. 146, f. 2, 1868, *Acanthochiton fascicularis*.

‡Since this paper was written, I have been kindly furnished by Dr. v. Ihering with copies of his extremely important work on the "Anatomy of the Nervous System and the Phylogeny of the Mollusca," and two valuable papers concerning the *Chitonidæ*

Since differences exist between the results obtained, in working out the nervous system of *Chiton*, by different naturalists, it is thought best

(from Gegenb. Morph. Zeitschr. iv, April, 1877), and their allies. In the first-mentioned work, the author comes to somewhat different conclusions from Brandt in regard to the details of the nervous system, both in *Chiton (cinereus)* and *Patella vulgata*, though the differences are not so fundamental as a first glance at the somewhat diagrammatic figures might suggest. In the "Anatomy" the author considers as a separate phylum (*Amphineura*) the Chitons, together with *Neomenia (Solenopus* Sars) and *Chatederma*, placing them under *Fermes*, while the *Docoglossa* and most of the Prosobranchiate Mollusks form the third phylum (*Arthrocochilides* Ibr.) of the Mollusca. In the later paper on *Neomenia*, &c., Ihering seems disposed to concede a more intimate relation between the *Fissurellidæ* and Limpets on the one hand and the *Chitonidæ* on the other. His figures would indicate a more near relation between *Fissurella* and *Chiton* than between the latter and *Patella*, so far as the nervous system goes. It must be borne in mind, while considering his differences with Brandt in regard to *Chiton*, that the species examined by Ihering, *Trachydermon cinereus* Lowe, is one of the lower forms of *Chitonidæ*, closely related to the lowest existing genus, *Leptochiton*; while that dissected by Brandt belongs to the higher of the two great groups of *Polyplociphora*. It would be natural, therefore, that the nervous system of the former should more nearly resemble the wormlike forms from which the Chitons may have come out, and that the latter should be closer to the Limpets, which, though less specialized, I can hardly doubt sprang from the same original stock. It is also within the bounds of probability that in the details of the nervous system, as in all other details, the characteristic variability (within certain limits) of the group of *Chitonidæ* may assert itself.

I cannot refrain from expressing, here, my conviction that there are at least two points of view from which the classification of these invertebrates may be regarded in a scientific sense. The army of embryologists, to whom, in these later days, we owe so much new light, with the enthusiastic self-confidence born of successful innovations, as a general rule deny the existence of more than one scientific point of view. More than one of them has dogmatically asserted that science in natural history now consists in the study of embryology alone, and phylogenetic classifications deduced therefrom. It has been said that careful and minute anatomical investigations and histological researches based upon adult animals no longer deserve the name of science. It has even been averred that the only object of classification now is the representation in words of phylogenetic diagrams, or the derivative relations of animals according to the particular author's hypotheses. It is therefore somewhat refreshing to find that a school of naturalists is gradually forming, for whom anatomy as compared with pure embryology has still some attractions.

No one denies that a classification may be grounded exclusively upon the embryonic development, and may possess a high scientific character, nor that among the higher animals such a basis must form a principal part of the foundation of any scientific classification which may be applied to them.

But what seems to be lost sight of by some of those who have escaped from the bonds of the Cuvierian system, is the fact that some of the derivatives from two parallel stocks may resemble one another more closely than specialized forms derived from the same stock; that in the early stages of the development of organisms before well-defined lines of specialization for the adults had been fixed by natural selection and other factors, variations were necessarily rather the rule than the exception among the embryonic forms, even when of common origin; that the missing stages, "abridged development," etc., reported by most later embryologists, are, in all probability, the traces of the original vacillations and accelerations of primal evolution. and that a truly philosophical classification must take these things into account.

It must not be forgotten that we have to deal with results as well as methods, with

to reproduce here the accessible material, and wait for more information before considering the subject as fully decided.

The figure here given, after Brandt's researches on *Acanthochiton fascicularis*, may be supposed to present the general features of the nervous system in the higher members of the group.

The accompanying figure (C²) of part of the nervous system of *Chiton*

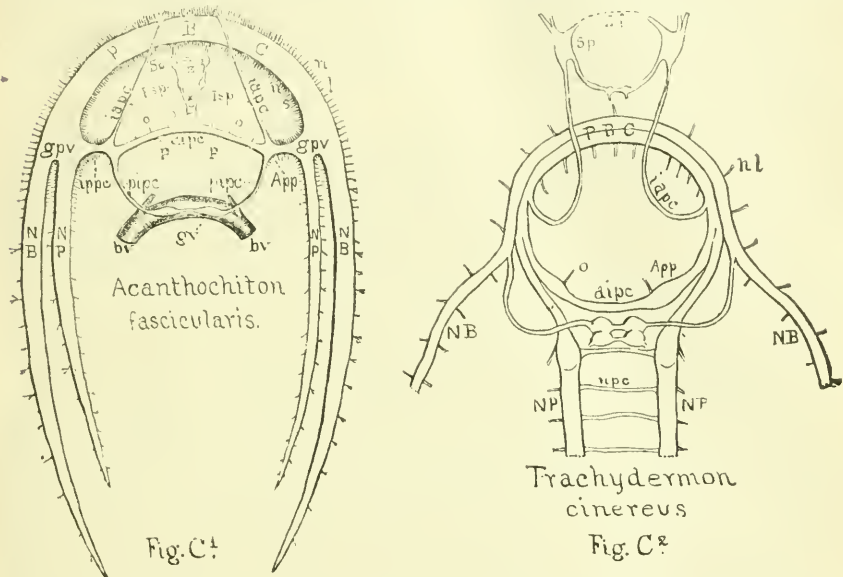


FIG. C.—PBC, pedo-branchial commissure; NB, nervi branchiales; NP, nervi pedales; nl, nervi labiales, small filaments numerous and hardly traceable; ns, nervi pharyng. superiores; gpc, ganglia pedo-visceralia seu pedo-branchialia; iapc, inter-anterior-pharyng. commissure; ippc, inter-pedo-pharyngeal commissure; App, anterior inferior pharyngeal ganglia; aipc, anterior inferior pharyngeal commissure; pipc, posterior ditto; gr, ganglia vascularia, resting on br, a blood-vessel (the small commissure separating these ganglia is called by Brandt the intervascular commissure); sp, anterior superior pharyngeal ganglia; Psp, posterior superior pharyngeal ganglia; x, superior posterior post-pharyngeal ganglion; z, anterior superior pharyngeal commissure; Isp, inter superior pharyngeal commissure; oo, anterior inferior pharyngeal nerves; pp, posterior ditto.

termini as well as routes, with adults rather than embryos. We do not live in a world of embryos alone, in any but the most metaphysical sense. We cannot learn the relations of animals, as they are, to each other from the embryological phylum alone, any more than we could understand the nations of modern Europe and their political boundaries from a map of the Aryan migrations.

To apply this reasoning to the matter in hand in detail would require much more space and time than are at present available. Yet it may be said that we have high authority for considering that the mollusks and worms are derived from a common origin, and that, in fact, the former derive their characteristic features from the tendency to specialization and development within the compass of a single segment, or a very small number of segments, while the worms are characterized rather by reduplication of more simple segmental parts in great number, but small variety among themselves. Various groups of mollusks may owe their greater or less participation in fea-

(*Trachydermon*) *cinereus* is from Ihering. It will be seen that there are comparatively few important differences between the two; the pedal commissures (*npe*); the separation of the ganglia *App* from close connection with the anterior (*iape*) and posterior (*pipe*) loops; the larger and more conspicuous buccal ganglia (*Sp*) and the less complete coalescence of the strands forming the pedo-branchial commissure (*PBC*) are the most conspicuous features. Further research is required to determine how much of these differences is due to the diagrammatic character of the figures, and how much to the systematic difference between *Trachydermon* and *Acanthochiton*.

The nervous system of *Acanthochiton fascicularis* chiefly consists of two large angular ganglia bound together by a large flat commissure. These two principal ganglia, which lie on the sides of the buccal mass, may be taken as a consolidation of the *ganglia pedalia* and the *ganglia branchialia seu visceralia*; thence springs out a *nervus pedalis*, which supplies the foot and muscles with minute rami on each side of the nerve; also a *nervus branchialis*, which passes along a furrow on the inner edge of the mantle, giving out secondary rami to the branchiæ. The cerebral ganglia are wanting, unless we consider with Middendorf that they form part of the pedo-branchial commissure. Brandt objects to this view on the ground that the commissure throughout its whole breadth is similarly formed and gives out similar nerves; namely, *nervi labiales* from in front, and a multitude of minute nerves to the pharynx behind. As Chitons have in the adult condition neither eyes nor tentacles, so the absence of these ganglia (from which in other forms nerves are given out to those two organs only) seems very natural. This commissure may also be called the *pedo-branchialis*, and it may correspond with the *commissura cerebralis*, from which similar nerves have been demonstrated to spring. This commissure also presents resemblances to the nerves and ganglia of the stomato-gastric system, common to many gasteropods, in its intense yellow color. A commissure binds each pedo-branchial ganglion with a little inferior pharyngeal ganglion, and the same also connects these inferior pharyngeal ganglia with one another by an inferior interpharyngeal commissure (as in *Patella vulgata*,

tures, generally more characteristic of *Annulosa*, from the different times at which they started from the common stock on an independent career of specialization.

All this in no wise authorizes the combination in one group of worm-like mollusks and molluscoid worms. The writer has persistently opposed such ill-considered conglomerations as wholly unphilosophical. Even were there embryological identity, which no one has claimed, such a course seems to him to indicate an ignorance of the meaning of terms in systematic nomenclature, or the confounding of the two starting points for classification, to which allusion has been made. He will even venture to predict that when the anatomy and development of two hundred, instead of two, species of Chitons and Limpets, are worked out, a single phylum will express their relations to the worms, to each other, and to the other true gasteropods; and to assert that, in his opinion, nothing is so likely to conduce to this simplification than the continuation and amplification of the really admirable work upon which Dr. v. Ihering and others have of late been engaged.

in which also it is bow-shaped, with the concavity forward), and through still another commissure with the two upper pharyngeal ganglia.

From each inferior pharyngeal ganglion, a long, thin commissure extends, binding it with a large subovate ganglion, which may be called the posterior inferior pharyngeal ganglion; and the others must then take the name of the anterior inferior pharyngeal ganglia. The two former are connected by a little arched commissure, and lie behind the aorta. From the anterior inferior pharyngeal ganglia three pairs of nerves proceed before and one behind the buccal muscle. The anterior superior pharyngeal ganglia are connected by five commissures with each other and other ganglia. From the superior anterior pharyngeal ganglia proceed two small nerves for the upper buccal muscles. The posterior superior pharyngeal ganglion sends out a small nerve to the upper lateral buccal muscle, and from the superior posterior post-pharyngeal two small nerves are traceable to the radula.

Circulation.—Our knowledge of this is due to Middendorf, to whose ponderous and not very satisfactory monograph of *Cryptochiton Stelleri* the student is referred. More light is needed on this subject.

Sexual Organs.—The *Chitonidae* are of two sexes, wherever they have been examined by the writer, and the number of forms which has passed under review is so large that there can be no doubt this is the rule throughout the group.* The histological characters of the male and female gland resemble those of the Limpets, at least in general appearance. The most superficial observer can separate the sexes when the characters have once been called to his notice. It is true that Middendorf found, or believed he found, spermatozoa in the ovisac of *Chiton (Symmetrogephyrus) Pallasii*, but this may be accounted for in another way; and I may say, definitely, that I have examined both males and females of that species. The glands of both sexes open on each side of the anus, in some species quite close to the latter, in others much further forward and in advance of the most posterior branchiæ. The opening may be a simple pore or small aperture forming the termination of a sexual duct, or it may consist of what I have termed a *fenestra*, or elongated slit, crossed by several bands of tissue, so that there may seem to be from two to seven oblique slits, each extending partly behind the front end of the slit behind it. In these cases, I have not been able to determine the existence of a continuous oviduct, and am inclined to believe that the ova may pass from the oviduct into the perivisceral cavity, and from thence, through the fenestræ, reach the exterior.

The ovisac and sperinsac are more or less convoluted and asymmetrical. They are probably the result of fusion of two original glands in the median line, if, indeed, they are not partly separated in some species, as seemed in one or two instances to be the case. The ducts, when carefully examined, are seen to spring from the anterior abdominal side of the sac, not from the posterior end.

* Dr. v. Ihering arrives at the same conclusion.

Clark observed the eggs being ejected in a sort of stream from the openings into the water and settling in loose clusters on adjacent objects. Verrill and Carpenter have confirmed these observations, and add that the hinder part of the foot is so raised as to form a sort of funnel, out of which the eggs emerge. But these eggs, in some cases at least, are already impregnated, and somewhat far advanced in developement before they leave the oviduct. I have myself observed, in several individuals which had been some years in spirit, eggs developed as far as the first stage figured (47 *a*), which had never left the ovisac. In this connection it may be observed that, if the sperma be ejected into the water, there is nothing to prevent the spermatozoids from entering the wide apertures of the fenestrae (in some species at least), and thus impregnating the eggs in the ovary. In this way may be explained the presence of spermatozoa in the female *Chiton Pallasii* noted by Middendorf. In some species with very small ovarian openings, this internal impregnation would be attended with more difficulty. In some species, a large so-called "slime gland" is present, lying under the middle line of the ovisac. Gray states that in some Chitons the egg is enfolded in a thick, vesicular, folded envelope, but I did not notice anything of the kind in those I examined. I observed no micropyle, but having only specimens hardened, by long immersion in spirits these observations cannot be deemed conclusive. In all the species specially examined to determine the character of the ova, the eggs were spherical, with a rather tough skin, quite smooth, with no trace of lime in it, and apparently in no way attached to the walls of the ovary when ripe.*

Development.—Nothing later than the brief but admirable researches of Lovén, now thirty years old, has come to hand. His figures are here reproduced, with a summary of what has been observed, to stimulate further enquiry in those favorably situated.

The Chitons differ from most Mollusks in that the shell does not appear on the embryo until some time after they are hatched. In this connection, the observations of Krohn on *Marseniidae* may be referred to.

The embryo of *Chiton cinereus* is oval, with no trace of shelly valves or depressions for them, and is divided into two nearly equal parts by a transverse depression, the margins of which are ciliated. On the middle of the upper part is a tuft of filaments which move slightly. At each end of the depression are two dark points, representing the eyes.

The young when hatched (Fig. 47 *b, c*) become more elongated, the front part is finely ciliated, and the tuft occasionally vibrates. The hinder part extends more rapidly and becomes conic. The back is marked by seven furrows; between these the first rudiments of the shelly

* Dr. v. Ihering describes the egg of *C. squamosus* as covered with peculiar thorns, five-sided solid columns, expanding at the distal end into a cup whose edge is cut into five points. *C. Cajetanus* and *fascicularis* had eggs covered with a grooved and irregularly furrowed membrane, as described by Gray, but without thorns. The vesicular membrane thus may be considered as a chorion. In the immature stages, the eggs are enclosed in follicles of the tissues of the ovisac.

valves make their appearance in the form of fine granulations. Soon after this, the animal can crawl as well as swim, and the mantle becomes separated from the foot by an indentation. The eyes are placed on the ventral side, and hardly visible from above. The upper anterior part of the animal is marked with acute tubercles. The mouth is not yet visible. The valves first appear in the form of seven narrow bands with irregular margins; the tuft disappears. The head and mouth then develop (Fig. 47 *e*). The eyes are on distinct lateral protuberances. No gills have appeared. The mantle and front valve advance over the head (Fig. 47 *f*) and eyes; the tuberculated area in front of the valves is gradually diminished, and the tail-plate appears behind the seventh. The valves are at first irregular, but increase from below, and deep notches, persistent in the adult, are formed on the front edges, one on each side. It will be seen that the valves are formed each in one piece, and not by the coalescence of parts corresponding to the various areas of the adult valve. There are eight valves in all Chitons, though monsters with seven valves have been occasionally reported; they lack the horny jaw possessed by Limpets.

Renal Organs.—Middendorf indicated the existence of a renal organ in the delicate glandular structure which in some species covers the upper posterior surface of the foot below the viscera. This does not seem to be uniformly present; at least, I did not detect it in some cases, and I failed to find any excretory opening. It is probable that this exists, but the contraction of the tissues of my specimens by alcohol may have obliterated it.* Schiff in *C. piceus* did not detect any renal organ, and unless in an abortive condition it seems probable that it is not always present.

Dentition.—The dentition of the Chitons has received hardly any attention. The only figures which have been given, so far as known to me, are those of *C. laevis* and *C. cinereus* by Lovén† in his original paper, the latter of which has been copied by Gray;‡ a figure, intended to represent the radula of *C. Stelleri*, by Middendorf;§ of *C. piceus* by Schiff;|| of "*C. marmoratus*" by Eberhard;¶ and a figure of *Chitonellus* sp. by Gray.‡ Of all these only the figure of Lovén possesses any value, the others being more or less erroneous, or conveying an erroneous impression. Even the number of teeth is not correctly represented by any one but Lovén. On the basis of the teeth, the Chitons were combined with the Dentalia and Limpets in the order *Docoglossa* by Troschel, a proceeding justified by that single character; for the characteristics of

* Dr. v. Ihering has succeeded in finding an orifice immediately below the anus, in some species.

† Ofv. K. V. Akad. Forh. June 9, 1847, t. 6.

‡ Guide to Brit. Mus. 1857, pp. 182, 187.

§ Beitr. Mal. Ross. i, pl. iii, f. 11, 1847.

|| Zeitschr. Wiss. Zool. ix, pl. ii, Beitr. zur Anat. v. *Chiton piceus*.

¶ Programm Herz. Realschule zu Coburg, 1865, f. 77. (Since the above was written, Prof. Sars has figured the dentition of several species.)

the teeth in composition and general form (though not in number) are somewhat similar to one another and differ from all other groups much more than they differ among themselves. But other characters of greater importance seem to turn the scale unequivocally in favor of a somewhat wide separation of these groups, and the term *Docoglossa* was adopted by the writer some years since for the order containing the Limpets alone.

The teeth agree in number and in general character in all the genera and subgenera of Chitons which I have been able to examine; comprising about half of the groups recognized by the late Dr. Carpenter. No large group of genera or subgenera remains of which some form has not been studied. Hence we may reasonably infer, until the contrary is proved, that all the genera agree in the most essential characters of the dentition. Some doubt exists in my own mind as to the proper distribution of the eight side-teeth into true laterals and uncinals, since the fifth from the centre is constantly spatulate, yet separated from the cuspid teeth by two boss-like or non-cuspidate teeth resembling uncini. The formula therefore may be read either as

$$\frac{1}{3+1+2+2 \times 2+2+1+3'} \quad \frac{1}{3+5 \times 5+3'} \quad \text{or} \quad \frac{1}{6+2 \times 2+6'}$$

The most natural division is into six uncinal and two true laterals. For convenience in description, I shall term the spatulate third uncinus the *major uncinus*, the second lateral the *major*, and the first the *minor lateral*. The "inner" side of a tooth is that toward the middle line of the radula. In all Chitons examined, there is a simply cuspid rhachidian tooth, and on each side a translucent minor lateral of varying form; a major lateral larger than any of the other teeth with a conspicuous black cusp, which may have from one to four denticles; two boss-like or thickened uncinal plates of irregular shape; a twisted spatulate uncinal and three scale-like or slightly thickened external uncini. With the exception of the spatulate uncinus (which is abortive in a very few species), none of the uncini are much raised above the plane of the odontophore, and none present any characters of importance. The characters of the other teeth, though preserving a tolerable uniformity within the particular subgenera, so far as observed are rather variable within a certain narrow range, and on the whole it would be premature to say that they offer more than specific distinctions.

The absence of any well-marked types by which the order might be divided into families, or even subfamilies, is very remarkable, and in this respect the variations of the dentition agree with the other characters of shell-plates, girdle, and internal structure. This has already been remarked as regards the girdle and shell by Dr. Carpenter, who recognized that even his chief divisions of the order into Regular and Irregular Chitons failed to possess distinct family value.

The only other dental formula which recalls in any degree that of *Chitonidae* is that of *Triopa lacer* as figured by Gray in his Guide.

The teeth of the Chitons are excessively difficult objects to make out, though some of the species are quite large. The teeth project strongly from the odontophore, so that only a small portion of any one tooth can be had in focus at one time. Moreover, they overlie one another to such an extent that part of them, especially the two inner uncini, are hidden from view. The radula has to be pulled to pieces, to get at the form of the individual teeth. They will, like the teeth of Limpets, disintegrate under prolonged boiling in *liquor potassæ*, so that it is difficult to clean the radula from adherent mucus or remains of food. The teeth on the anterior edge of the radula are always worn or broken by use; those at its posterior termination are of course immature and pulpy; the scaly uncini differ slightly in form with age. The rhachidian tooth is usually more or less embraced by the wings of the minor laterals, so that it appears as if set on a plate or in an open box, and must be disentangled before its form can be made out.

In these descriptions, the front of a tooth is taken to be the side opposite to that by which it is attached to the radula. The figures of dentition do not pretend to represent the transverse rows as they appear on the unbroken radula. On the contrary, the teeth are represented diagrammatically as they would appear if separated from one another, yet, as nearly as practicable, in their relative positions. Only in this way could any idea be given of their forms and number. A series of exquisite drawings, made by one of the best zoölogical draughtsmen living, for Dr. Carpenter, nearly led me into serious error, and have been totally rejected, because they represented only what could be seen without dismembering the radula. The diagrams given, if somewhat rude, are, it is believed, tolerably reliable, and the result of a surprising amount of work, considering their small number.

The rhachidian tooth, as has been stated, always has a simple cusp, which may possess a somewhat sinuous edge or a tendency to a median sinus. The points by which it is attached to the odontophore are darker than the rest, and, seen through the translucent shaft, modify its appearance. A side view of the tooth generally presents an S shape, and it usually projects from the surface of the radula in a conspicuous manner. The shaft and base have not been observed to present any ornamentation.

The minor laterals present many modifications of form which may be referred to one type fundamentally. They consist of two parts, a shaft, and wings bearing the same relation to the shaft that the sides of a leaf do to its midrib. One or both of the wings may be almost abortive, leaving only the shaft twisted into a cusp at its apex, or the edges of the wings may be bent over into a cusp at the top of the tooth, and a small process like a bud or button is thus sometimes formed on the outer upper angle of the tooth. The most common form is that where the teeth are somewhat leaf-shaped, with both wings partly developed. The outer wing aborts before the inner one. These wings meet the midrib at an angle with each other, and this angle is sometimes less than a right angle.

Usually, the two inner wings nearly meet one another behind the rhachidian tooth, while the two outer ones extend toward each other before the rhachidian tooth. In the unbroken radula, the rhachidian teeth each seem as if enclosed or fenced in by this arrangement of the two adjacent laterals.

The major laterals show fewer modifications. They are always the largest and most prominent teeth on the radula. They consist of a recumbent shaft, which is partly hollow or excavated behind, crowned by a cusp whose opaque consistency contrasts strongly with the brown translucent shaft and other teeth. This cusp is usually black, or yellowish with a black margin. In some species, a peculiar areolated spot is visible on the margin, and this may exist in some species in which I have not figured it, as it is difficult to observe except with a very strong reflected light. It does not appear to mark a pore or indentation, but from its constant occurrence in some species must have a certain significance.

The cusp may be rounded, or ovate, or elongated and simple, or it may be divided into two, three, or four denticles of uniform or varying size. The value of these characters cannot yet be definitely stated; they can hardly yet be said to present more than specific value, so far as the number of cusps is concerned, yet the general features agree, for the most part, in the same or nearly related groups.

In *Leptochiton*, the cusp is greatly elongated, with a small secondary denticle on the inner side, which is abruptly turned up, and, on an ordinary view, resembles a spur or thorn set on the principal cusp. In general, the northern species show a tendency to elongated cusps, simple or divided; the tropical species, including the typical Chitons, a tendency to a rounded, simple cusp. The majority of all species, however, have a tridentate cusp.

The shaft and cusp are separated by a distinct line of demarcation where the color changes from black or opaque to translucent. The shaft tapers from the cusp to the lower extremity, which is usually a little expanded. Extending downward from the base of the cusp, the groove or tube in the back part of the shaft is clearly visible. There are thin expansions of the shaft on each side, and sometimes a median keel on the front of the shaft, which in several species is produced into a slender, translucent process, of lanceolate or varied form, extended somewhat inward (toward the rhachidian tooth) and upward toward the cusp of the tooth upon whose shaft it is borne. These processes are most strongly marked in the teeth of the typical Chitons.

The two inner uncini, between the major lateral and the spatulate or major uncinus, are very irregular in form, even on the same radula. They lie prone on the radula and possess no true cusps, though thickened and elevated into knobs of various form. The major uncinus rises from a very small base, which is twisted and bent under it (as if the tooth was kneeling), and has a twisted, slender shaft, which is expanded at its extremity into a spatulate or feather-formed cusp. The whole tooth

is so twisted and bent that the distal ends of the major uncini, as a rule, are protruded between the cusps of the major laterals. In a very few species, chiefly of *Cryptoidea*, the shaft and cusp are abortive, leaving only the small base or knob from which they spring in other species. No very salient characters are afforded by the major uncini.

The outer uncini have essentially the same characters in nearly all the species. They are flat and scale-like, their edges free and overlapping slightly. The outer ones forming the edge of the radula are usually more transverse than the others. In *C. articulatus*, they are remarkably transversely extended.

It will be seen from this description that, except in their construction and chemical character, the teeth of Chitons are quite dissimilar to those of Limpets, or, indeed, any other described group.

While not affording grounds for generic distinction by itself alone, the dentition of Chitons, as far as yet investigated, confirms, in many respects, the classification adopted on other grounds by Dr. Carpenter. For instance, his separation of the northern *Tonicella* from the tropical *Tonicia* of Gray, with which they have usually been united, is fully justified by differences in the dentition. It is possible that when the dentition of the majority of species is determined, some reformation in the limits of subordinate groups may be made practicable by its indications, but this is not yet the case.

The following list of the chief groups recognized by Dr. Carpenter, with the character of the dentition when known, will give a clue to the extent of the work done, and that which is still a desideratum.

A.—REGULAR CHITONS.

LEPTOIDEA.

Leptochiton Gray. (Type *L. asellus* Lowe.)

L. cancellatus Sby. Minor lateral reduced by abortion of the wings nearly to a simple shaft. Cusp of major lateral elongate bidentate; inner denticle much the smallest, spur-like; shaft simple; other teeth quite simple. Fig. 1, 1 a, showing major lateral from above. *L. rugatus* agrees.

Hanleyia Gray. (Type *H. debilis* Gray.)

H. mendicaria M. & Ad. Minor lateral normal, bi-alate; major lateral tridentate; major uncinus short, other uncini with thickened edges. Fig. 2.

Deshayesiella, *Microplax*, and *Hemiarthrum* not examined.

ISCHNOIDEA.

Trachydermon Cpr. (Type *T. cinereus* Lowe.)

T. ruber Lowe. Minor lateral normal, leaf-shaped, with the upper edge of the outer wing bent over into a sort of cusp; cusp of major lateral with one large and one small denticle on the inner side, shaft normal; major uncinus short, with a widely expanded apex with fine radiating grooves on the edge. Fig. 3; 3 a shows the major uncinus from below.

T. albus L. Minor lateral with small wings bent backward; shaft cusped at the top; major lateral bidentate, as in the case of *T. ruber*, but with the small denticle on the outer side; major uncinus long, spatulate. Fig. 4.

Trachygradia, *Callochiton*, and *Stereoichiton* not examined.

Tonicella Carpenter. (Type *T. marmorea* Fabr.)

T. lineata Wood. Minor lateral with a long shaft, bi-alate, normal; major lateral with two small denticles on the inner side of the cusp and one large outer denticle, shaft normal; major uncinus spatulate, normal. Fig. 5.

T. marmorea Fabr. As in the last, but with only one small inner denticle on the cusp of the major lateral. Fig. 6.

T. submarmorea Midd. Minor lateral shaped like a ploughshare; other teeth much as in the last. Fig. 7.

Schizoplax Dall.

S. Brandtii Midd. (Type.) Minor lateral a broad shaft with a simple cusp, base with a groove or sinus, no wings; major lateral tridentate. Fig. 8.

Leptoplax not examined.

Chaetopleura Shuttleworth. (Type *C. Peruviana* Lam.)

C. gemma Cpr. Rhachidian tooth broad and short; minor lateral normal, outer wing inconspicuous; major lateral tridentate, shaft keeled, keel with a small elongate cuspidate process. Fig. 9.

? *C. Hartwegii* Cpr. Minor lateral reduced to a broad cusped shaft with a remnant of an inner wing and a thickened base; major lateral tridentate, with no keel or process, shaft normal. Fig. 10.

Maugerella Cpr.

M. conspicua Cpr. (Type.) Minor lateral bi-alate, top of inner wing and shaft bent into a twisted cusp with a small process extending outward from the apex of the shaft; major lateral tridentate, shaft with a keel and cuspidate process. Fig. 11.

Spongiochiton not examined.

ISCHNOCHITONS.

Heterozona not examined.

Stenoradsia Cpr.

S. magdalenensis Hinds. (Type.) Shaft of minor lateral with a cusp and process, inner wing normal, outer wing inconspicuous; major lateral tridentate, with a keel and cuspidate process on the front of the shaft. Fig. 12.

Stenoplax Cpr.

S. limaciformis Sby. (Type.) Rhachidian tooth very small; minor lateral normal, shaft with a minute hook at the apex; major lateral with a simple cusp, shaft bearing a keel and cuspidate process; major uncinus very small. Fig. 13.

Ischnoplax Cpr.

I. pectinatus Sby. (Type.) Minor lateral with broad, stout, cusped shaft, inner wing expanded, outer wing reduced to a rudiment, with a linguiform process; major lateral with a simple rounded cusp, shaft with a triangular keel but no projecting process. Fig. 23.

Ischnochiton Cpr. ex Gray. (Type *I. longicymba* Quoy.)

I. cooperi Cpr. Minor lateral with the outer wing reduced to a button near the cusp of the shaft, inner wing small; major lateral with simple cusp, shaft with a keel, bearing a cuspidate process; major uncinus broad, spatulate, thicker near the edges. Fig. 15.

I. interstinctus Gld. Minor lateral composed of a shaft with large, twisted, hooked cusp, and possessing only slight rudiments of wings; major lateral tridentate, keeled on the shaft, with a spatulate process on the keel; uncini rugose, major uncinus sharply bent, strengthened by narrow ridges on the spatulate cusp. Fig. 16.

I. regularis Cpr. Teeth closely resembling those of *I. Cooperi*, but minor lateral with a small outer wing. Fig. 14.

Ischnoradsia Cpr. non Shuttleworth.

I. trifida Cpr. Minor lateral with no outer wing, but a small process near the apex of the shaft, which may represent it; inner wing normal; major lateral shaft normal, cusp bidentate, with a spot behind the notch (Fig. 17*a*); uncini rugose, normal. Fig. 17.

Lepidopleurus Cpr. non Risso.

L. Mertensii Midd. Minor lateral with no outer wing; shaft cusped at apex, inner wing normal; major lateral with a simple cusp, shaft normal, deeply channelled behind. Fig. 18. Fig. 18*a* shows the appearance of the minor laterals and their wings extending behind the rhachidian tooth as they do when in their natural position.

Lepidoradsia Cpr. (*Lophyrus* pars Adams.)

L. australis Sby. Minor lateral with a singular mushroom-like cusp with rudiment of inner and no outer wing; major lateral bidentate, shaft keeled with spatulate process; major uncinus short, broad, other uncini rather small. Fig. 19.

Callistochiton Cpr.

C. palmatus Cpr. Minor lateral with a narrow inner wing parallel with and no wider than the shaft, cusped at the top, outer wing absent or represented by a minute cuspidate process; major lateral with a simple cusp, shaft with an anterior keel bearing a subnucolate process. Fig. 20.

Callistoplar, *Ceratophorus*, and *Newcombia* not examined.

Pallochiton Dall (= *Hemphillia* Cpr. MSS. nom. præoc.).

P. lanuginosus Cpr. Minor lateral normal, bi-alate; major lateral tridentate, shaft normal. Fig. 21.

LOPHYROIDEA.

Chiton Cpr. Lin. not Adams. Type *C. tuberculatus* Lin. (*Lophyrus* H. & A. Ad. not Poli).

C. articulatus Sby. Minor lateral with no outer wing, shaft small, narrow, prone, from which extends the greatly elongated cusped inner wing external to the rhachidian tooth; major lateral with a simple rounded yellowish cusp with a black margin marked by a peculiar spot; shaft normal, with an inner lateral expansion produced into a linguiform process; major uncinus broad, long, spatulate; outer uncinus transversely elongated. Fig. 22. Fig. 22*a*, side view of rhachidian tooth.

C. Stokesii Brod. Minor lateral with expanded inner wing, shaft cuspidate, cusp twisted and outer wing reduced to a portion of this cusp or absent; major lateral with an elongated simple cusp, shaft thick, strong, keeled in front, keel bearing a blade-shaped process attached to the keel at two points, with a small foramen between them; major uncinus short, broad, somewhat plumbe-shaped. Fig. 24. Fig. 24*a*, major uncinus, from below.

C. Cumingii Fremby. Minor lateral normal, with wings recurved above and on each side; major lateral with simple elongate cusp, shaft with a strong keel bent outward below and produced above into a strong spoon-shaped process; two inner uncini nodulose; major uncinus with a slender and rather straight shaft. Fig. 25.

C. assimilis Ree. Minor lateral: shaft with small or nearly abortive wings, base long and recurved; major lateral with a simple rounded cusp, a keel on the shaft bearing a spatulate process; major uncinus feather-shaped, the vane on the inner side. Fig. 26.

Tonicia Gray.

T. elegans Fremby. (Type.) Minor lateral leaf-shaped, normal, apex curved forward; major lateral with an orange, black-edged, rounded, simple cusp with a spot on the margin, shaft normal; major uncinus very much twisted and decurved, spatulate. Fig. 27.

Radsia, *Fannyia*, *Eudocochiton*, and *Craspedochiton* not examined.

ACANTHOIDEA.

Sclerochiton, *Francisia*, *Dinoplax*, *Dawsonia*, *Beania*, and *Arthuria* not examined.

Acanthopleura Cpr. ex Guilding.

A. spinigera Sby. (Type.) Minor lateral large, shaft long, cusped, wings long, narrow, linguiform; major lateral with a simple rounded cusp, shaft keeled, keel with a cuspidate process; inner uncini nodulose; major uncinus short, broad, thick. Fig. 28.

Lucia Gld.

L. confossa Gld. (Type.) Minor lateral twisted, peculiar, outer wing broad, recurved at tip, inner wing small, strengthened by a branch from the shaft (Fig. 29a); rhachidian minute; major lateral with a quadridentate cusp, shaft with its inner expansion terminating in a cuspidate process above; inner two uncini ridged; major uncinus feather-shaped, vane on the inner edge (29b). Fig. 29.

Corephium Gray (not Brown).

C. echinatum Sby. (Type.) Minor lateral with the shaft expanded above, with a cusp confluent with the upper edge of the small inner wing, outer wing small; major lateral with a rounded tridentate black-margined cusp bearing a spot on the middle denticle, shaft keeled in front, keel produced into a thin linguiform process; major uncinus asymmetrical, somewhat spoon-shaped. Fig. 30.

Nuttallina Cpr.

N. scabra Rve. (Type.) Minor lateral normal, bi-alate; major lateral normal, with plain shaft and tridentate cusp; major uncinus long, slender, with small expansion at the tip. Fig. 31.

Phacellopleura Cpr. ex Guilding.

P. porphyritica Rve. sp. unica. Minor lateral with an inner but no outer wing, otherwise normal; major lateral normal, with plain shaft and tridentate cusp; inner uncini nodulose; major uncinus normal, spatulate. Fig. 32.

B.—IRREGULAR CHITONS.

SCHIZOIDEA.

I have not been able to obtain the radula of any of the few species comprised in the genera *Lorica*, *Aulacochiton*, *Schizochiton*, *Enoplochiton*, and *Onithochiton*.

PLACIPHOROIDEA.

Placiphora Cpr. ex Gray.

P. Carmichaelis Gray (= *C. setiger* King and *Fremblyi* Brod.). Type. Rhachidian tooth with its edges folded inward. Minor lateral with a large narrow inner wing, small outer wing, and a median keel on the slender shaft; major lateral with a large tridentate cusp, shaft slender, normal; major uncinus with a small expansion at the tip. Fig. 33.

Euplaciphora, *Fremblyia* (= *Streptochiton* Cpr.), and *Guildingia* not examined.

MOPALOIDEA.

Mopalia Cpr. ex Gray.

M. ciliata Sby. (Type, = *muscosa* Gld. + *Hindsii* Gray.) Minor lateral normal, bi-alate; major lateral normal, tridentate with a plain shaft; inner two uncini ridged; major uncinus rather short, normal. Fig. 35, 35 a.

M. Wosnessenskii Midd. (*Kennerlyi* Cpr.). Similar to the last with a longer major uncinus. Fig. 34.

Placiphorella Cpr.

P. velata Cpr. (Type.) Rhachidian very large; minor lateral unusually small, both normal; major lateral tridentate, normal. Fig. 36, 36 a.

Katherina Gray.

K. tunicata Wood. (Type.) Minor lateral thin and coalescent with the inner wing above, outer wing small; major lateral normal, tridentate; uncini ridged or knobby, except major uncinus, which is elongate and narrow. Fig. 37.

Acanthochiton Herrm. ex Leach. (Type *A. fascicularis* Auct.)

A. avicula Cpr. Minor lateral with the shaft branched at base, leaf-shaped; major lateral with tridentate cusp; shaft with triangular keel, of which the tip is bent outward; major uncinus short, normal. Fig. 38.

A. spiculosus Rve. Minor lateral normal, bi-alate; major lateral and other teeth much as in the last. Fig. 39.

Macandrellus Cpr. (Type *M. costatus*, Ad. & Ang.)

M. costatus? Ad. & Angas. Like *Acanthochiton avicula*, but the shaft of the major lateral normal without a keel. Fig. 40. Specimen from Port Jackson, Australia.

Stectoplax and *Notoplax* not examined.

CRYPTOIDEA.

Cryptoconchus Blainv.

C. monticularis Quoy. (Type.) Minor lateral normal, leaf-shaped, base geniculate; major lateral with tridentate cusp and plain normal shaft; a rugosity on the second uncinus projecting inward over the first; major uncinus slender, short. Fig. 41.

Amicula Gray. (= *Symmetrogephyrus* Midd., *Stimpsoniella* Cpr.)

A. vestita Shy. = *Emersonii* Couth. Gld. (Type.) Minor lateral bi-alate, normal; major lateral tridentate, with plain shaft, whose lateral expansions are bent backward to the radula, forming a vaulted hollow arch beneath the upper part of the shaft; major uncinus aborted. Fig. 43.

A. Pallasii Midd. (Type of *Symmetrogephyrus*.) As in the last, except that the sides of the major lateral are bent forward, and the major uncinus is present and normal. Fig. 42.

Chlamydochiton not examined.

Cryptochiton Midd. Gray.

C. Stelleri Midd. (Type.) Minor lateral normal, leaf-shaped; major lateral with tridentate cusp and a small keel on the shaft; inner two uncini ridged, major uncinus aborted. Fig. 44.

Chitonellus Blainville.

C. fasciatus Quoy. (Type.) Minor lateral bi-alate, with a strongly curved shaft; major lateral normal, tridentate with a plain shaft; uncini more or less ridged, major uncinus nearly straight, long, slender, spatulate. Fig. 45, 45 a.

It will be seen that Gray's figure (here reproduced) is very erroneous, and seems to have been taken from the immature end of the radula.



FIG. D.—Teeth of *Chitonellus*, after Gray.

Choneplax, *Chitoniscus*, and *Cryptoplax* not examined.

Nomenclature.—The nomenclature of Chitons has suffered greatly from neglect of various writers to specify or adopt types of the genera they proposed or used. The neglect of internal characters in assorting species into genera has also been fruitful of difficulty; the Messrs. H. and

A. Adams being among the greatest sinners in these respects. The revision of the nomenclature by Dr. Carpenter with the co-operation of the writer was incomplete at the time of his death, and is not yet perfected. It would be out of place here, even if ready for publication; but a few words on the genus *Chiton* as restricted by Carpenter may not be superfluous.

1753.—Linné described the genus *Chiton* in the tenth edition of the *Systema Naturæ*, according four species to it, of which only one, *C. tuberculatus*, is identifiable.

1766.—S. N. ed. xii. Nine species were described by Linné, of which the first is unrecognizable and the second is *C. tuberculatus*.

1776.—Müller (Prodr. Zool. Dan.) describes several species, but selects no type.

1784.—Spengler monographs the group; his first species is *C. tuberculatus* L.

1798.—Tabl. Éléén. p. 391, Cuvier gives an unrecognizable *C. punctatus* as his sole example.

1799.—Lamarck (Prodr. An. s. Vert. p. 90) gives as his sole example *C. tuberculatus* Lin.

1801.—Lamarck (Système An. s. Vert. p. 66) gives as an example *C. gigas* Chemnitz, not a Linnean species.

1815-18.—Wood (Gen. Conch. and Index Test.) gives as his first species in both cases *C. tuberculatus* L. These works antedate Lamarck's Hist. An. s. Vert.

1854.—Messrs. Adams selected, as the type of *Chiton*, *C. aculeatus* Auct., an unfortunate proceeding, since the *C. aculeatus* of Linné is unrecognizable. This arrangement was properly rejected by Dr. Gray and Dr. Carpenter.

From the rules for zoölogical nomenclature it follows that a type cannot be selected by any one for a genus proposed by any author which type was not known to and included by that author in his original list of species, if he himself omitted to specify a type.

C. tuberculatus, though described from an imperfect seven-valved specimen, is recognized by Hanley as *Chiton squamosus* of Born. It is figured by Reeve as *C. squamosus* L. var. β (Conch. Ic. pl. iv, f. 23), and in the index is called "*striatus* Barnes." It has not been generally united with the *C. squamosus* of L. (S. N. ed. xii), but is not improbably a variety of it, and belongs to the same restricted group. It comes from the West Indies. Under the circumstances, there can be no doubt that it should be considered as the type of the genus, not only because it is the only recognizable species of those originally described, but because it was selected by Lamarck as his sole example of the genus in 1799, and served as the first species in many of the earlier works in which the Chitons were enumerated or described. The genus *Chiton* was called *Lophyrus* by Adams, from the name applied to the animal by Poli, who was a non-binomial writer. It was more correctly treated by Gray and by Dr. Carpenter in his later writings, though at one time he had, without investigation, followed the lead of Messrs. Adams.

The first authors to whom science is indebted for discriminating the different groups or genera of Chitons are chiefly Guilding, Lowe, Shuttleworth, and Gray. As all the characters were not perceived at the outset, even these writers were not perfectly consistent in their grouping, as has since become evident. But this was inevitable, and it only

remains to rectify the disorder by the light of present knowledge, a task which may not long be delayed. If some modern authors, who have instituted wholesale changes in nomenclature, had followed a consistent and uniform plan, and not neglected or hurriedly decided on doubtful points, the work of rectification might have been much more simple, though perhaps not less urgently needed.

A few words may be added in regard to the names given by Middendorff. In spite of the opportunities afforded by his study of the Russian Chitons, this distinguished savant seemed to fail to catch the permanent as distinguished from merely individual characters, and his classification and nomenclature are not borne out by subsequent researches. His chief characters were derived from the dimensions of the soft or coriaceous girdle, dimensions which differ not only in the same species, but in the same individual, respectively, if preserved in spirit (when it may be broad) or dry (when it shrinks to a narrower compass). From this cause it is not surprising to find the same species figuring in both of his chief divisions of Chitons with exposed valves. In the attempt to utilize this impracticable classification, and unwilling to admit that the *Chitonidae* contain more than one genus, he adopted a singular nomenclature, in which the genus was divided into a great number of sections, subsections, sub-subsections, etc., so that his work can hardly be classed as binomial in the Linnean sense. Fortunately, without exception, the groups indicated had previously been properly named by Gray, and only by courtesy can the genus *Cryptochiton*, on which his industrious research was largely expended, be assigned to him as authority, since it was denominated by the same name by Dr. Gray but a short time previously, the researches of each being unknown to the other.

To Blainville, in 1816, is due the credit of first recognizing the anomalous characters of the *Chitonidae*, and their separation as an independent group from other gasteropods. While the value of a class in view of later researches may be held to be too high, yet few will be disposed to deny them the ordinal value assigned by Gray in 1825. The name is preferably spelled *Polyplaciphora*, though numerous other forms have been used.

The order *Polyplaciphora* can with certainty be asserted to contain but one family, so far as our present knowledge is concerned. No groups of subfamily value have yet been recognized, and it is a question whether any exist. It would be out of place here to attempt any *résumé* of the various systems of classification proposed by authors who have written on Chitons, as that proposed by Dr. Carpenter has solely been followed, and the process would occupy too much space.

Dr. Carpenter's arrangement is founded upon the plan of structure in the valves, the extent of the branchiæ, and the ornamentation or character of the girdle and its covering. He divides the *Polyplaciphora* into two great divisions:

I. REGULAR CHITONS.

Head and tail plates of similar character.

II. IRREGULAR CHITONS.

Tail-plate with a sinus behind.

The Regular Chitons comprise—

A. *Leptoidea*.

Destitute of teeth or slit insertion-plates.

B. *Ischnoidea*.

Insertion-plates slit, sharp, thin; protected by eaves.

This contains by far the largest number of species, and might be considered typical; but the organization is not as complete in all points as in the next group.

C. *Lophyroida*.

Insertion-plates broad, pectinated; jugular sinus broad, dentate.

D. *Acanthoidea*.

Insertion-plates sharp, grooved externally, eaves furrowed beneath, mucro posteriorly extended.

This forms a passage toward II.

The Irregular Chitons comprise—

E. *Schizoida*.

Mantle and tail-plate both slit, behind.

F. *Placiphoroidea*.

Posterior insertion-plates only represented by a pair of swollen ribs. Mantle hairy.

G. *Mopaloidea*.

Tail-plate with one slit on each side and waved behind.

H. *Cryptoidea*.

Valves covered, or nearly so, with posterior as well as anterior sutural laminae.

I. *Chitonelloidea*.

Tail-plate twisted into a funnel, body anteriorly extended.

Of these groups, Dr. Carpenter says: "I have purposely abstained from giving the usual terminations in *idæ* and *inæ* because I am not sure that the groups here proposed are entitled to rank even as subfamilies."

It seems to the writer that these groups are by no means of equal value, and that the Regular Chitons might well be reduced to two: Leptoids, and the remainder combined into one group; while the second section might be assorted into Schizoids (including F and G), Cryptoids, and Chitonelloids.

The opinions of Dr. Carpenter, the result of years of study, and an examination of all the principal collections of these animals in the world, are, however, not to be lightly set aside.

The Chitons of Alaska forming the principal subject of this report, together with notes on allied or extra-limital forms, are now in order. For the use of the figures illustrating this article, and many other favors and facilities for study, I am indebted to the Smithsonian Institution, in charge of Prof. S. F. Baird.

CHITONES IRREGULARES.

MOPALOIDEA.

Genus MOPALIA Gray.

Mopalia Gray, P. Z. S. 1847, pp. 65, 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 478, 1854. (*M. Hindsii* Sby.)

Molpalia Gray, Guide, p. 184, 1857 (err. typ.).—Gould, Otia, p. 118.

Lorica regularis; laminae longiores, suffultae; v. ant. plurifissatâ, v. caet. unifissatâ, ad caudam sinuatâ; sinus angustus; muero medianus, depressus; suturae indentatae; zonâ latior, setosâ, interdum simplex, interdum postice fissata, interdum antice projecta; branchiae mediae.

Subg. *Mopalia* s. str.

Zonae setae irregulariter obsitae. (*M. Hindsii* Sby.)

Sect. *a*, normales; Sect. *β*, aberrantes.

Subg. *Placiphorella* Cpr.

Zonae setae ad suturam fasciculatae. (*P. velata* Cpr.)

Sect. *a*, zonâ antice dilatata. (*P. velata* Cpr.)

Sect. *β*, zonâ et loricâ normales. (*P. sinuata* Cpr.)

The genus *Mopalia* is the most regular in growth of all the Irregular Chitons. It is characterized by a hairy or lanugate girdle extending on or between the valves to some extent in all the species, thin insertion-plates with one slit on each side of the hind valve, which is waved inward from behind in the median line. There is generally a pronounced wave or slit in the tail end of the girdle, but this is an inconstant character even in the same species. The anterior valve has six or more slits in most cases. The typical subgenus is divided into normal and aberrant forms, the latter having the anterior portion of the girdle much produced, as in *M. Blainvillei* Brod.; both sections having the hairs irregularly distributed. In *Placiphorella* the hairs or part of them issue in fasciculi from pores at the sutures. These also are divided into two sections, the first having the anteriorly expanded girdle as in the last section of *Mopalia*, while the second resumes the normal type of shell and girdle. Many species have been described, but it becomes necessary, as will be seen, to reduce the number.

Mopalia ciliata.

Chiton ciliatus Sowerby, Conch. Ill. p. 79, 1838.—Reeve, Conch. Icon. Mon. Chiton, pl. xix, f. 124, 1847.

Mopalia ciliata H. & A. Adams, Gen. Rec. Moll. i, p. 478, 1854.

Chiton setosus Sowerby, Beechey's Voy. Zool. p. 150, pl. 41, f. 17, 1839 (not of Sow. 1832).

Chiton Collicii Reeve, Conch. Icon. Mon. Chiton, pl. xxi, f. 136, 1848.

Leptochiton Collicii H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

Chiton muscosus Gould, Proc. Boston Soc. Nat. Hist. ii, p. 145, July, 1846; Moll. Expl. Exp. p. 313, f. 436, 1852.—H. & A. Adams, Gen. Rec. Moll. i, p. 475, 1854.—Gould, Otia, p. 6, 1862.

Mopalia ciliata.

Chatopleura muscosa Gould, Otia, p. 242, 1862.

Mopalia muscosa Carpenter, Suppl. Rep. Br. As. 1863, p. 648.

Chiton Wosnessenskii Midd. Mal. Ross. i, p. 101, 1847; in part only; figure and part of diagnosis excl.

Chiton armatus (Nutt.) Jay, Cat. 1839, No. 2678. No descr.

Chiton ornatus Nuttall, MS. Brit. Mus. Col. etc. and

Chiton consimilis Nuttall, MS. loc. cit. never described.

Subsp. Mopalia lignosa.

Chiton lignosus Gould, Proc. Boston Soc. Nat. Hist. ii, p. 142, July, 1846; Otia, p. 3, 1862; Exp. Sh. p. 330, f. 424, 1852.

Chatopleura lignosa Gould, Otia, p. 248, 1862.

Mopalia lignosa Carpenter, Suppl. Rep. Br. As. 1863, p. 648.

Chiton Merckii Midd. Bull. Imp. Acad. Sci. St. Petersburg. t. vi, p. 20, 1846; Mal. Ross. i, p. 115, pl. xi, f. 5-6, 1847.

Chiton Eschscholtzii Midd. Bull. l. c. p. 118; Mal. Ross. l. c. p. 114, pl. xi, f. 4 (t. jun.).

Chiton (Hamachiton, Stenosemus) Merckii Midd. l. c. p. 34.

Chiton Montereyensis Cpr. P. Z. S. 1855, p. 231.

Chiton vespertinus Gould, Moll. U. S. Expl. Exp. p. 323, f. 426, 426 a, 1852.

Chatopleura vespertina Gould, Otia, pp. 230, 242, 1862.

Mopalia vespertina H. & A. Adams, Gen. Rec. Moll. i, p. 479, 1854.

Mopalia Simpsoni Gray, P. Z. S. 1847, p. 69.—H. & A. Adams, Gen. Rec. Moll. i, p. 479, 1854; Brit. Mus. Coll. In all cases name only; never described. (From type.)

Chiton californicus (Nutt. MS.) Reeve, Conch. Ic. Mon. Chiton, pl. xvi, f. 89, 1847.

Var. M. Hindsii.

Chiton Hindsii (Sowerby MS.) Reeve, Conch. Ic. Mon. Chiton, pl. xii, f. 67, a, b, 1847.

Mopalia Hindsii Gray, P. Z. S. 1847, pp. 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 478, pl. liv, f. 7, 1854.—Cpr. Suppl. Rep. Br. As. 1863, p. 213.

M. t. intus, v. posticâ ad caudam sinuatâ; v. centr. uniffiss., v. ant. octofissatâ; dent. longis, suffultis, sæpe extus rugosis; subgrundis minimis spongiosis; sinu minimo, acuto, lam. sutur. ab apice antico solum separatis; zonâ setiferâ sen lanuginosâ; valvis parum postice, antice valde apicata; zonâ postice haud sen varius fissatâ.

Lon. 25-60, Lat. 15-40 mm. Div. 140°.

Hab.—Shumagui Islands (rare) to California; Dall! between tide-marks and at lowest water. Many specimens (hundreds) examined.

Typical form: sculpture variable, but strong; girdle thickly set with tubular hairs, varying from long, strong bristles to fine, soft pilæ. The best distinguishing features are brown or blackish olive color outside; inside, bluish green and lilac; jugular and caudal sinuses narrow, the latter often not visible externally.

Subsp. *lignosa*: sculpture faint; inside greenish; sinus variable; hairs of the girdle variable, but always softer and shorter than in well-marked *ciliata*, often hardly perceptible in dry specimens; external colors grayish or greenish, with streaks and flammules of brown and white.

Var. *Hindsii*: exterior uniform, smoothish; sculpture evanescent; color outside, light olive to nearly black; inside, whitish, carmine in the me-

dian line; tail notched in the young, but not in the adult; tail-sinus visible outside; girdle with few and short hairs.

This species can be distinguished from all varieties of *Wosnessenskii* by its blackish and proportionately much narrower girdle, and by a sort of prolongation of the external layer of the shell forward under the apex of the next anterior valve in the median line, forming a sort of anterior false apex, which is hidden until the valves are separated. In *Wosnessenskii* this part is squared off, the girdle is yellowish (when alive), and the valves are much less transverse.

It will be surprising if those who have only observed these animals by a few dry specimens in collections are willing to accept the synonymy above given. I confess that not long since I would have been unwilling to believe that the rough, bristly, typical *muscosa* and the dark, smooth *Hindsii* could be properly combined under one name with each other or with the finely reticulated and painted *lignosa*. But the study of a large multitude of specimens has convinced me no arbitrary line can be drawn anywhere in a fully representative series, beginning with coarsest *ciliata* and ending with a practically smooth *Hindsii*. The characters of girdle, sculpture, and form are not only variable in themselves, but are found variably combined, except that it is rarer to find coarsest sculpture with a downy than with a bristly girdle. However, even this occurs. On the other hand, out of such a series a dozen forms might be selected which, if only the characters were constant, every one would acknowledge as good species.

In his description of *Wosnessenskii*, Middendorf, according to Dr. Carpenter, had both species under his observation, and did not observe it. His figures, however, belong solely to the following species. Sowerby's *setosus*, in the Zoology of the Blossom's Voyage, is not his species so named in 1832, and the former was renamed *Collicii*, by Reeve, in the Conch. Iconica. The sculpture figured by Sowerby was not characteristic; Reeve's figure is better. From an examination of the type, Dr. Carpenter became convinced that the undescribed *M. Simpsoni* Gray was identical with *lignosa*. There is very little doubt that Middendorf's *Chiton Eschscholtzii* was merely a young *ciliata*. Dr. Gould's original types have been consulted during the preparation of this description.

Mopalia Wosnessenskii.

Chiton Wosnessenskii Midd. Bull. Imp. Acad. Sci. St. Petersburg. t. vi, p. 119, 1847 (pars); Mal. Ross. i, p. 101 (diagn. maj. pars), pl. xi, f. 1-2, 1847.

Chiton (Hamachiton, Platysmus) Wosnessenskii Midd. Mal. Ross. l. c. p. 34, 1847.

Chiton coclatus Reeve, Conch. Icon. Mon. Chiton, pl. xvii, f. 101, 1847 (loc. err.).—H. & A. Adams, Gen. Rec. Moll. i, p. 475, 1854.

Mopalia Kennerleyi Carpenter, Suppl. Rep. Br. Assoc. 1863, p. 648; Proc. Phil. Acad. Nat. Sci. April, 1865, p. 59.

Mopalia Grayi Carpenter, Suppl. Rep. l. c. p. 603, name only.

M. Kennerleyi var. *Suanii* Cpr. Suppl. Rep. l. c. p. 648, 1863.

M. t. valvis laud antice apicatis; v. post. extus valde sinuatâ; intus v. post. late ad caudam sinuatâ, et v. centr. 1-, v. ant. 8- (rarius 9-, 10-)

fiss.; sinu latiore; zonâ postice fissatâ, setis tenuioribus, planatis, pallidis, minus confertim obsitâ. Lon. 50, Lat. 25 mm.

Var. *Swanii*: t. omnino rufâ, sculpturâ tenuiore.

Hab.—Unalashka, Aleutian Islands (rare and small) to Sitka, and southeastward to Monterey, California; from low water to twenty fathoms, adhering to solid objects, stones, and shells! Two hundred and fifty-four specimens examined.

This species may be recognized by its broad, yellowish, downy girdle, when fresh, often encroaching far into the sutures; by the absence of false apices, such as are found in *ciliata*; by its color, in which vermilion and verdigris green are beautifully mingled (except in the var. *Swanii*, which is pure red); and by the softness of the flattened and less crowded hairs. The girdle-fissure is not constant, though usual. It is nearly white inside; the sinus is broader and the valves, as a whole, longer in an axial direction, making them less transverse than in *ciliata*. It is one of the most beautiful of all Chitons, when closely examined.

An examination of the soft parts afforded the following notes on this species:

The "fringe," or true mantle-edge, is entire, extending around the whole body within the edge of the girdle, and slightly notched at the posterior sinus of the girdle. Veil short in front and broad at the sides, ending behind in two broad, squarish lappets, the edge crenulate throughout. Anus median, distinct. Ovary single, tortuous, overlying the viscera, with no distinct oviduct, so far as could be observed. In texture, the ovary resembles that of *Acmæa*. If there be an oviduct, it passes from the under side of the sac, one-third of the way forward from the posterior end of the ovary. Behind the ovary are two "slime glands" (Midd.), one on each side, opening outward by a plain opening in a fold of the integument, one on each side between the branchiæ and the anus. They are not present in all Chitons. Schiff did not find them in *C. piceus*. Gills about thirty-eight in number on each side, extending forward about two-thirds the length of the foot.

Extra-limital Species.

Subgenus PLACIPHORELLA Cpr.

Placiphorella sinuata.

Mopalia sinuata Cpr. Proc. Acad. Nat. Sci. Philad. 1865, p. 59.

P. t. lam. sutur. planatis, ab apice antico-externo separatis, sinu angustissimo; dent. valde suffultis.

Hab.—Puget Sound and San Francisco Bay, Cal.

Placiphorella imporcata.

Mopalia imporcata Carpenter, l. c. p. 59, 1865.

P. t. lam. sutur. et apice antico ut in *P. sinuatâ*, sinu paullo minus angusta; dent. parum suffultis; v. ant. octofissatâ.

Hab.—Puget Sound; Santa Barbara Ids., Cal.

These species are known to me only by the types; they may extend their range into the Alexander Archipelago.

In *Placiphorella velata* Cpr., type of the subgenus, the gill-rows are as long as the foot, branchiæ about twenty-five in number, widely separated behind. Mantle-edge behind narrow and plain; in front produced and fringed with long fleshy processes. No oviduct could be traced, though the ovary was crowded with eggs, some of which were 0.25 mm. in length. In them the embryo could be plainly distinguished. There were no furrows for the shelly plates, but the eyes were quite prominent and the cephalic lobe comprised nearly half the animal. There were no bands of cilia, but the edge of the cephalic lobe was strongly ciliated.

CRYPTOIDEA.

Genus AMICULA Gray.

Gray, Syn. Brit. Mus. 1840, also ed. 1842 (no description); P. Z. S. 1847, pp. 65, 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 480, pl. 55, f. 2, 1854.—Gray, Guide, p. 187, 1857.

Type *Chiton vestitus* Sowerby.

Corpus regulare; loricâ expositâ parvâ, mucronatâ, seu subcordatâ; laminae insertionis mopaloideæ, lam. sut. post. magnæ; zonâ plus minusve pilosâ, interdum poriferâ.

Subgenus *Amicula* s. str. (Gray).

Branchiæ mediæ. *A. vestita* Sowerby.

Subgenus *Chlamydochiton* (Dall).

Branchiæ ambientes. *C. amiculata* Pallas.

Both groups are provided with pores bearing fasciculi of bristles of a soft or horny character, and which, while often irregularly disposed or even almost entirely absent (in particular individuals), have a tendency to arrange themselves in two rows on each side of the median line, one row behind the exposed point of the valve and another near its submerged lateral posterior angle, on each side. The mantle is also provided with a coating of fine, chaffy, deciduous scales.

Subgenus AMICULA (Gray) Dall.

Amicula Gray, l. c. 1847. (*C. vestitus* Sow.)

Symmetrogephyrus Middendorf, Mal. Ross. i, p. 98, 1847. (*C. Pallasii* Midd.)—Chenu, Man. i, 383, 1859.

Stimpsoniella Carpenter, Bull. Essex Inst. v, p. 155, 1873. (*C. Pallasii* Midd. and *Emersonii* Couth.)

Middendorfia Carpenter, MS. 1871.

Amicula vestita.

Chiton vestitus Sowerby, Zool. Journ. iv, p. 368, 1829; Conch. Ill. f. 123, 128a (from type-specimen), 1839; Zool. Beechey's Voy. p. 150, pl. xli, f. 14, 1839.

? *C. amiculatus* Wood, Ind. Test. pl. 1, f. 12, 1828 (probably).—Reeve, Conch. Icon. Mon. Chiton, pl. xi, f. 59, 1847.

Amicula vestita.

Amicula vestita Gray, P. Z. S. 1847, pp. 65, 69, 169.—H. & A. Adams, Gen. Rec.

Moll. i, p. 480, pl. 55, f. 2, 1854.—Gray, Guide, p. 187, 1857.

Amicula vestita Cpr. Bull. Essex Inst. 1873, p. 155.

(? *Var. Emersonii.*)

Chiton Emersonii Couthouy, Bost. Journ. Nat. Hist. ii, p. 83, pl. iii, f. 10, 1838.

Chiton Emersonianus Gould, Inv. Mass. p. 151, f. 19, 1841.—Reeve, Conch. Icon. Mon. Chiton, pl. xi, f. 59, 1847.

Amicula Emersonii Gray, P. Z. S. 1847, p. 69.—H. & A. Adams, Gen. Rec. Moll. i, p. 481, 1854.—Gray, Guide, p. 185, 1857.—Stimpson, Smithsonian Checklist of East Coast Shells, 1830.—Binney's Gould, p. 234, f. 527 (bad), 1870.

Amicula vestita Stimpson, Shells of N. Engl. p. 29, 1851.

Stimpsoniella Emersonii Cpr. Bull. Essex Inst. 1873, p. 155.

A. t. valvarum parte expositâ (huic generi) majore, latâ, subreniforme, antice acutâ sed haud prolongatâ, lateribus rectangulatis, postice bilobatis, sinu latiore; ar. jug. centr. et lat. haud definitis; totâ superficie granulosâ, supra jugum læviori; circa marginem undique (nisi ad mucronem in sinu postico) bicostatâ; intus, v. post. typice mopaloideo, utr. lat. unifissatâ, sinu caudali lato, brevior; v. centr. 1-, ant. 6-fiss.; laminis acutis, fissuris parvis, sulcis ex fissuris haud loriceam tenus continuis; lam. sut. ant. haud separatis, sinu lato, brevi; post. minoribus sed à sinu postico alto latiore omnino separatis; (*Cpr.*) Zonâ tenui, lævior; setulis furfuraceis et fasciulis setarum plus minusve irregularis suprâ zonam expositâ. Lon. 50, Lat. 35 mm.

Hab.—Arctic Ocean, extending southward in the Pacific region to Hagmeister and St. Paul Islands, Bering Sea; on the Atlantic south on the New England coast to Cape Cod; in 5-30 fathoms, mud and stones. Two young specimens, not certainly of this species, in 60 fathoms, Captain's Bay, Unalashka. Thirteen specimens examined.

The "ovarian" openings, bilaterally symmetrical, are situated just behind and, as it were, under the shadow of the posterior branchia on each side. They are not simple orifices, but fenestrae, composed of two openings somewhat oblique and linear; the anterior a little nearer the girdle and a little larger than the posterior one.

I have no doubt whatever that the original *vestitus* of Sowerby (from Beechey's original locality I have examples) is identical with the *Emersonii* of Couthouy.

Much has been said about the presence or absence of 'pores' and hair-tufts. I find from examination of a series that the young *Emersonii* is usually smooth, the large ones always setiferous. These setæ are, as described by Dr. Gould, in two rows on each side, or rather six in all if we count the pretty constant tufts behind the exposed apices of the shell. These rows are (1) two behind the shell points as above; (2) two, one on each side at the posterior angle of the submerged expansion of the valve; (3) a series, more or less irregular, along the margin of the girdle. Beside this, in old ones, there are irregular tufts all over the girdle, and some of the regular tufts may be missing.

Dr. Carpenter, seeing young specimens, could not recognize the pore-tufts of Gould. Shortly before his death, however, he sent me specimens which showed them plainly; it is evidently a character in this group of very little importance.

As regards its identity with *vestita*; when dry, the New England form precisely resembles the figures from Sowerby's type-specimen in his Conchological Illustrations, taken from a dried specimen. He considered *Emersonii* a synonym, and I fully agree with him, but have kept the two separated in the foregoing synonymy for the convenience of those who may doubt this.

This species is very close to *A. Pallasii*, but is distinguishable by the larger and laterally much more expanded exposed portions of the valves, by its flatter form, and proportionally sparser and longer setæ. When dry, the whole form of the valves is visible in *vestita* from above, like the bones of a Peruvian mummy; in *Pallasii*, however, the integument is so much more coriaceous and thick, that in dry specimens hardly anything of these outlines is visible. Middendorf's figure, copied by Chenu, well represents *A. Pallasii* when fresh. In cabinets it is rare, and is not common in the field where collectors have searched for it.

Amicula Pallasii.

Chiton Pallasii Midd. Bull. Acad. Sci. St. Petersb. vi, p. 117, 1847.

Chiton (subg. *Phænochiton*, sect. *Dichachiton*, subs. *Symmetrocephyrus*) *Pallasii* Midd. Mal. Ross. i, p. 98, 1847; Sib. Reise, p. 163, t. xiii, f. 1-9; t. xiv, f. 1-6, 1851.

Amicula Pallasii H. & A. Ad. Gen. i, p. 481, 1854.—Chenu, i, p. 383, 1859.

Stimpsoniella Pallasii Cpr. Bull. Essex Inst. 1873, p. 155.

A. t. valvarum mucrone cordiformi solum externe conspicuâ; intus v. post. mopaloideâ, utr. lat. unifissatâ, sinu caudali minore, laminâ posticâ extus rugosâ lato, brevi; v. centr. 1-, v. ant. 6-8-fissatis; lam. acutis ex fissuris umbonem tenuis sulcatis; lam. sutur. ant. modicis haud separatis, sinu lato brevi; post. latis, regulariter arcuatis, à sinu postico lato alto separatis, (Cpr.) Limbus (zonâ) luxurians in pallium extenditur, totum animalis dorsum rotundatum obtegens, valvas obvolvans et occultans, solis octo aperturis minutis, rotundatis, in linea mediana, quibus aditus ad umbonem valvarum patet; color squalido lutescens; epidermis dorsalis undique versum fasciculis pilorum crinitâ. Lon. 67, Lat. 48, Alt. 21 mm. Div. 120°.

Hab.—Okhotsk Sea, Midd.; Pribiloff, Aleutian, and Shumagin Islands, Dall! 3 to 10 fathoms, very rare. Seven specimens examined.

The rounded back, tough and hairy girdle with minute holes for the tips of the valves, the valves themselves less transverse as a whole and much less exposed than in *vestita*, are the characters by which this species may be readily distinguished from the latter. My specimens have only six fissures in the anterior valve against eight in a specimen of *vestita* of the same size.

It is even rarer than the last species, and hardly known in collections.

The gills are median; mantle-edge broad and even; the veil is pectinated and the anterior edge of the muzzle has a sort of rim or margin, besides.

Subgenus CHLAMYDOCHITON Dall.

Amicula Cpr. pars; non Gray, Adams, etc.

Chlamydochiton Dall, Proc. Nat. Mus. p. 1, Jan. 1878.

Chlamydochiton amiculatus.

Chlamydochiton amiculatus Dall, l. c.

Chiton amiculatus Pallas, Nova Acta Petrop. ii, p. 241, pl. vii, f. 26-30, 1788.—Gmelin, Syst. Nat. p. 3206, 1790.—Wood, Gen. Conch. p. 13, 1815.—Dillwyn, Cat. Rec. Shells, i, p. 6, 1817.—Blainville, Dict. Sci. Nat. xxxvi, p. 546, 1825.—Midd. Mal. Ross. i, p. 96, 1847.—H. & A. Adams, Gen. Rec. Moll. i, p. 480, 1854.

Not *C. amiculatus* Sowerby, Conch. Ill. f. 80, 1839, nor of Gray, P. Z. S. 1847, pp. 65, 69, 169, = *C. Stelleri* Midd.

Not *C. amiculatus* Wood, Ind. Test. f. 12, 1828, = *C. vestitus* (probably).—? Reeve, Conch. Icon. Chiton, f. 59, 1847.

C. t. extus Cr. *Stelleri*, jun. simili, sed apicibus valvarum rotundatis extantibus; intus, laminis v. post. mopaloideis, utr. lat. (et v. centr.) unifissatis; sinu caudali lato, altiore; lam. sut. anticis modicis junctis, sinu lato; posticis majoribus, regulariter arcuatis, extus hand sinuatis, postice sinu lato, alto, subapieem planato, hand laminato; fissuris usque ad apices sulcatis; zonâ coriaceâ, læviore poris seriebus 2 circa suturas et marginem, majoribus; seriebus inter valvas et irregulariter supra zonam sparsis, minoribus; setis porarum paucis, longioribus, hand spiculosis. Lon. 75, Lat. 40 mm. (*Cpr.*)

Hab.—"Japan," London dealer; Kuril Islands, Pallas and Steller; Farallones Islands, California, Newcomb! Two specimens examined.

This species probably has about the same distribution as *C. Stelleri*, though much rarer, and may by collectors have been taken for an imperfect or immature specimen of that mollusk; when dry, to a casual glance they appear very similar, the minute apices of the valves being hardly visible. The coating of the girdle is, however, of a wholly different character. Dr. Carpenter would have reserved the name *Amicula* Gray for this species, but that name cannot legitimately be separated from its typical species (*vestita*), which belongs in the other subgenus. The ambient gills are the only sound character. The pores, which gave Dr. Carpenter a great deal of unnecessary trouble, are in this group not even of specific importance. I have only seen specimens in Dr. Carpenter's hands, and insert his description of the characters. It is doubtless one of the very rarest of the Chitons. Its nearest allies are *A. Pallasii* and *vestita*.

The figures given by Pallas are sufficient to identify the species very well, but in his remarks he quotes notes by Steller, which refer to the

great *Cryptochiton Stelleri* of modern authors. Some specimens of *Stelleri* in the Berlin Museum are marked *amiculatus* on very ancient labels, so there can be little doubt that the two species were confounded by the earlier authors.

Genus CRYPTOCHITON Midd. and Gray.

Midd. Mal. Ross. i, pp. 1-96, pl. I-9, 1847. Type *C. stelleri* Midd.—Gray, P. Z. S. 1847, pp. 65, 69, 169; Guide, p. 185, 1857.

Valvæ omnino in zonâ immersæ; laminae insertionis rude mopaloideæ; lam. sutur. tam postice quam antice junctæ, postice trisinuatæ; zonâ minutissime fasciculatim pilosâ; branchiæ ambientes.

This genus was simultaneously described under the same name by Gray and Middendorf, apparently without knowledge of each other's labors; and both having the same species in view, though Gray erroneously supposed his type to be the *C. amiculatus* of Pallas, and called it by that name; his diagnosis and synonymy, however, showing that he really referred to *C. Stelleri*.

It appears probable, from some of Pallas' specimens examined by me in the Berlin Museum, that he included this species with the *amiculatus* in his distribution, and, in fact, unless carefully examined, almost any one might do the same.

Cryptochiton Stelleri.

Chiton Stelleri Midd. Bull. Acad. Sci. St. Pétersb. vi, p. 116, 1846.

Chiton (Cryptochiton) Stelleri Midd. Mal. Ross. i, p. 93, t. i-ix, 1847; Mém. de l'Acad. Imp. Sci. St. Pétersb. 6me sér. vi, p. 101, 157, 1849.—Schrenck, Amur-Land Moll. p. 271, 1867.

Chiton amiculatus Sowerby (not Pallas), Conch. Ill. f. 80, 80 bis, 1839.—Gray, P. Z. S. 1847, pp. 65, 69, 169.

Chiton sitkensis Reeve, Conch. Icon. Chiton, pl. x, f. 55, 55 b, 1847. (Not *C. sitkensis* Midd.)

Chiton chlamys Reeve, I. c. pl. xi, f. 60, 1847 (from type, Cpr.).

Cryptochiton Stelleri Gray, Guide, p. 185, 1857.—H. & A. Adams, Gen. Rec. Moll. i, p. 479, iii, pl. iv, f. 1, 1 a, 1854.—Carpenter, Suppl. Rep. Brit. As. 1863, p. 648.

(*Patellæ longæ Rondeletii* auf Kurilisch Kéru, Steller, Beschreib. Kamtsch. p. 177, 1774.)

C. t. intus; v. post. mopaloideâ, mucrone obtuso ad posticam trientem; sinu caudali alto, lato; fissuris utr. lat. unâ, subposticis, conspicuis; lam. sut. anticis latioribus, junctis, sinu jugali alto, modico, subplanato; v. ant. mucrone ad quartam partem posticam, normaliter utr. lat. 1- et ant. 3- (id est omnino 5-, sed interdum 4-6-, seu 7-) fissatâ; lam. sut. posticis longis, lateraliter conspicue sinuatis, medio junctis, sinu postico altissimo, pyramidalî, frustrato; v. centr. muc. ad quintam partem posticam; haud seu interdum 1-fiss.; lam. lat. et sutur. ant. haud separatis, sinu jugali angustiore, altissimo, irregulariter arenato,

haud planato; lam. post. super-suturalibus minoribus, longis, à sinibus marginalibus conspicue separatis; sinu postico altissimo, irregulariter gothico, lam. junctis; valvis omnibus mucronatis, mucrone seu umbilicoideo seu punctato seu pustuloso; zonâ omnino fasciulis minutis spicularum minimarum irregulariter conferte instructâ. (Cpr.) Lon. 200, Lat. 75 mm. Div. 130°.

Hab.—Japan Sea; Sakalin Id.; Kuril Ids.; Kamohatka (southern extreme); the Aleutian Islands and the whole coast southward to Monterey and the Santa Barbara Islands, California. Usually found just below tide-marks, and often cast up on the beach in great numbers by severe gales. Collected abundantly at Unalashka and Sitka, also at Monterey; Dall!

This the largest and in many other respects the most remarkable of all Chitons is readily recognized by its wholly covered valves, no indication of which is evident, even under the skin, in fresh examples. It is covered with cells, each holding a fascicle of small spines, which, when dry, have an urticating effect upon the skin of those who may handle them. The foot and softer parts are used as food by the Aleuts and Indians; they are eaten in the raw state. The back is of a fine ferruginous red when fresh; dried specimens are usually more or less distorted and mauled; one of those figured by Reeve appears to have been partly rotten.

There is a good deal of variation in the size and relative proportions of the valves in different individuals, and the fissures are sometimes partly abortive or abnormally multiplied.

The soft parts of this species have formed the subject of an extensive monograph by Dr. Middendorf in his first part of the Beitr. Mal. Rossica. To that work the student is referred for details.

Genus KATHERINA Gray.

Katherina Gray, P. Z. S. 1847, p. 65. Type *K. tunicata* Wood.

Lorica parva; zonâ lævis, in suturas valde expansâ; laminæ valde antice projectæ, v. post. sæpe lobatæ; sinus altissimus, spongiosus; branchiæ ambientes.

This is an aberrant genus. In the smallness of the exposed portion and smoothness of the girdle it resembles *Phacellopleura*; in the extreme anterior projection of the plates, and in the deep spongy sinus, it is most like *Nuttallina*, of which it might be regarded as an exaggeration with a smooth girdle; but the tail-plate has most affinity with the *Mopaloidea*. Specimens may be found with many lobes like *Phacellopleura*; but on comparison of many individuals it will be found that the normal arrangement is a mopaloid slit on each side, with an angular sinus at the tail, and that the extra slits are extremely irregular and secondary. In *Nuttallina*, the plan. on the contrary, is perfectly regular, and *Phacello-*

pleura appears to be of the regular type. Middendorf's figures of the plates are inaccurate, and Gray's description in the Guide differs from his more correct account in the Proc. Zool. Soc. (Cpr. MS.).

In the sole species of this genus, the ovary is convoluted and single. The ovarian openings are found on each side between the line of the branchiæ and the side of the foot. They are placed in the vicinity of the fifth branchia from the posterior end of the row. There are no slime glands. The organ of Bojanus appeared to be represented by a glandular deposit on the floor of the visceral cavity behind. The muzzle is plain, drawn down to corners behind on each side, but without flaps. Veil narrow, thin, plain, produced in a flap on each side of the muzzle. Mantle-edge narrow, plain. Branchiæ about sixty on a side in a row as long as the foot. Anus papillate, median, with a ridge extending each way from it. Soft parts yellowish to deep orange, girdle shining blue black.

Katherina tunicata.

Chiton tunicatus Wood, Gen. Conch. p. 11, fol. 2, f. 1, 1815; Ind. Test. Chiton, pl. 1, f. 10, 1828; Ib. ed. Hanl. 1856.—Sowerby, Beechey's Voy. Zool. p. 150, t. xli, f. 15, 1839.—Reeve, Conch. Icon. Mon. Chiton, f. 61 (good), 1847.

Chiton (Phanochiton, Hamachiton, Platysmus) tunicatus Midd.—Mal. Ross. i, p. 98, t. x, f. 1-2, 1847.

Katherina tunicata Gray, P. Z. S. 1847, p. 69; Ib. Guide, p. 185, 1857.—Cpr. Suppl. Rep. Br. As. 1863, p. 648.

Katherina Douglasiæ Gray, P. Z. S. 1847, p. 69.

Katherina tunicata H. & A. Adams, Gen. Rec. Moll. i, p. 479, iii, pl. 54, f. 8, 1854.

K. t. extus, valvis postice fere rectangulatis; areâ jugali longissimâ, antice inter lam. sutur. projectâ, tenuissime punctulata; area centr. rotundatis, quincuncialiter fortiore punctatâ; ar. lat. hand definitis, fere obsoletis; mucrone subpostice mediano, elevato; intus, v. post. laminis ad caudam angulatim sinuatis, præcipue utr. lat. unifissatis, sed interdum in lobas irregulares $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{5}$ fiss.; v. centr. 1-, ant. 7-fissatis; laminis prælongis, antice valde projectis, acutis, extus striatis, fissuris parvis, suffultis, ad subgrundas solidas, curtissimas valde spongiosas, sulcis continuis; sinn altissimo, angusto, spongioso; lam. sutur. separatis, prælongis; zonâ migrâ, supra valvis tenui, omnino lævi. Lon. 50, Lat. 20 mm.

Hab.—Kamchatka (Cpr.); the entire Aleutian group; on the north side of the peninsula of Aliaska to Port Möller, and on the south side east to Cook's Inlet, and south to Catalina Island, California; low water (chiefly), to 20 fathoms. Several hundred specimens examined.

This unmistakable shell, characterized, when fresh, by its broad shining black girdle and almost covered valves, is eaten raw by the natives of the northwest coast, and is said to act as an aphrodisiac. The supposed second species of Gray is merely a result of an irregular drying of the girdle. The soft parts are of a salmon color in northern speci-

mens. The less important details are very variable in different individuals.

In taking leave of the Irregular Chitons, a few notes on exotic species of this section may be properly incorporated.

In *Chitonellus fasciatus*, the representative of the most highly developed type of Chiton, the gill-rows are confined to the posterior quarter of the foot, but the separate branchiæ of which they are composed are very large, twenty-six or eight in number, and rather long. There was no well-marked crop, as in ordinary Chitons. The muzzle was inconspicuous, angulated at the posterior corners, with no veil. Mantle hardly visible. There seemed to be two oviducts leading from a single ovary (compounded of two?) to small orifices, one on each side of the anus.

In *Cryptoconchus monticularis* Quoy, which much recalls the northern *Katherina*, the girdle varied from black to light brown. A veil was present, but narrow and simple, while the mantle-edge was hardly perceptible. Gill-rows one-third as long as the foot, containing each about eighteen branchiæ. Muzzle very transverse, with flaps at the posterior corners. Ovisac single.

CHITONES REGULARES.

LEPTOIDEA.

Genus LEPTOCHITON Gray.

Leptochiton Gray, P. Z. S. 1847, p. 127; Guide, p. 182, 1857.

< *Leptochiton* H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.—Chenu, Man. Conchyl. i, p. 381, 1859, etc.

< *Lepidopleurus* Risso (ex Leach MS.), 1826.—Sars, Moll. Reg. Arct. Norvegiæ, p. 110, 1878.

Lam. insertionis nullis; zonâ minutissime sabulosâ; sinus lævis; hand laminatus; branchiæ breves. Type *L. asellus* Lowe.

The diagnosis of Gray determines the genus, but he includes in the examples cited *C. albus* L., which is a *Trachydermon*. Two out of twenty-five species cited by the brothers Adams are real Leptochitons; the example cited by them as typical is not a *Leptochiton*, neither is the example cited by Chenu. The other Leptoid genera are as follows:

Hanleyia Gray, Guide, p. 186, 1857.

Anterior valve with an unslit insertion-plate; other valves without even the plates. *H. debilis* Gray.

Hemiarthrum Carpenter, Bull. U. S. Nat. Mus. iii, p. 44, 1876.

Insertion-plates present on all the valves, but entire without slits. *H. setulosum* Cpr. l. c.

Deshayesiella Carpenter MS.

Loricâ elongatâ; valvæ curvatæ, antice tendentes; mucro planatus, zonâ spiculosâ; lam. insert. nullis; lam. sut. triangulares, extantibus. *D. (Leptochiton) curvatus* Cpr.

Microplax H. Adams.

Resembling *Chitonellus* externally; submerged laminae unslit, entire, fused in an undistinguishable manner with the parts which usually constitute the sutural laminae. *M. Grayi* Ad. & Ang.

The paleozoic *Helminthochiton* Salter, *Priscochiton* Billings, *Gryphochiton* Gray, and several unpublished names of Dr. Carpenter, all belong to the Leptoidea. A large number of the fossils described as Chitons (for instance *Sulcochiton Grayi* Ryckholt) are not mollusks; many of them being valves of *Balani* or fragments of isopod crustaceans.

Leptochiton cancellatus.

Chiton cancellatus Sowerby (as ? of Leach MS.), Conch. Ill. f. 104-5, 1839.

Chiton albus Pulteney, non Lin. fide Hanley.

Chiton cancellatus Reeve, Conch. Ic. pl. lix, f. 152, 1847.

Chiton acellus Midd. Mal. Ross. i, p. 122, 1847, not of Lowe.

Chiton cancellatus Forbes & Hanley, Brit. Moll. ii, p. 410, pl. lix, f. 3, 1853 (outlines inverted in figure).

Leptochiton cancellatus H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

Chiton cancellatus Jeffreys, Brit. Conch. iii, p. 217, 1865; v, p. 198, pl. lvi, f. 1, 1869.

Chiton alveolus Jeffreys, l. c. iii, p. 218, 1865; not of Sars.

Chiton Rissoi anct. not of Payraudeau.

Lepidopleurus cancellatus Sars, Moll. Reg. Arc. Norv. p. 111, t. 7, f. 6 a-h, 1878, dentition t. I. f. 8, (imperfect).

? *Lepidopleurus arcticus* Sars, l. c. p. 112, t. 7, f. 7 a-h.

? = *Chiton islandicus* Gmelin, S. N. 3206, 1788.—Schröter, Einl. iii, p. 509.—Dillwyn, Rec. Shells, i, p. 10, 1817.

L. t. minimâ, elongata, valde elevatâ, regulariter arcuatâ; jugo nullo; aurantiâ plus minusve cinereo tinctâ, interdum albidâ; valvis angustioribus, haud rectangulatis, apicibus nullis; mucrone centrali, valde elevato, sculpturâ ut in *L. asello*, sed granulis parum majoribus; arcis centr. parum divergentibus, arcis lat. satis definitis, vix elevatis; *intus*, laminis sut. minimis, triangularibus; sinu latissimo, marginibusque valvarum à sculpturâ externâ paullulum erenulatis; *zonâ*, augustâ, squamulis tenuibus, haud imbricatis, haud striulatis, dense obsitâ. Lon. 6, Lat. 3 mm. Div. 80°.

Hab.—British seas; Norwegian coast in 50-100 fms.; Greenland; Gulf of Lyons (Jeffer.); Lofoten, 300 fms. (Sars); Vigo, Spain (McAndrew); Dahmatia (Brusina); Alaska, at Unalashka, Shumagins, Port Etches, and Sitka Harbor, 6-100 fms. Dall! Ninety-four specimens examined.

This species without careful inspection will usually be confounded with small specimens of *Trachydermon albus*, but a glance at the sculpture is sufficient to separate it. From several other species of *Leptochiton* it is less readily distinguished, and a magnifier is indispensable. The differential characters are as follows:

The pustules which constitute most of the sculpture are arranged like overlapping coins or a solid-linked chain in lines which in the dor-

sal area are nearly parallel with the longitudinal axis of the animal. The lateral areas are distinct, and the pustules upon them are arranged in rather indistinct lines radiating toward the lateral ends of the valves, at nearly right angles to the lines on the dorsal area. The sculpture on the mucro is more delicate than elsewhere. The apex of the posterior valve is not sunken, and is not so sharp as in other species compared with it here; the girdle is scaly, with also some small spinose transparent scales near the margin. There are five gill-plumes on each side, prominent and near the vent. There appear to be two fenestræ on each side. The lateral areas and other portions of the valves are nearly always colored with blackish or ferruginous patches, but these, as with *Trachydermon albus*, seem to be really composed of extraneous matter.

In *L. fuliginatus* Ad. & Rve., the pustules are much smaller, and while having a general longitudinal arrangement on the dorsum, do not form regularly defined rows or chains. The areas are not raised above the dorsum. The shell is much larger and more elevated, with a somewhat sunken and quite sharp posterior mucro. The other mucrones are not raised, but about them the sculpture is more regularly aligned than elsewhere. I have compared the valves of a typical specimen from Korea collected by Belcher. Reeve's figure of the sculpture is very bad, as are most of his details. *L. alveolus* Sars is a very distinct species, though it has been confounded with this. Its sculpture is composed of larger and rather more sparse, isolated pustules, absolutely irregular in distribution and of the same size on the mucro and elsewhere. Nowhere do they form lines. The arch of the back is peculiarly round, the lateral areas not raised and barely distinguishable. The girdle seems similar. I have compared typical examples.

L. concinnus Gould, from the types, is of a different color, and has a much stronger and different sculpture, like lines of rope.

L. internexus Carpenter and var. *rugatus* Cpr. are more like *concinnus*, but distinguished from either by the peculiar girdle covered with subequal scales.

L. nexus Carpenter more nearly resembles *cancellatus*, but the sculpture is of separate, not lapping, rounded-rhomboidal pustules; the mucrones are much more pronounced, and the white ground is prettily marbled with black and gray inherent coloration.

The name *cancellatus* is a misnomer, since it is only in certain lights that any trace of reticulation can be observed faintly. The young are flatter than the adults. It bears no resemblance to *L. asellus*, with which Middendorf united it, probably without a comparison.

L. arcticus of Sars seems to be a finely grown variety of this species, if one may judge from the figures; at least no differential characters are given which seem to be of a permanent character, and not subject to variation within the limits of a species.

The specimens of this species obtained by me in Alaska were at first referred to *fuliginatus* by Dr. Carpenter, and some specimens were distributed under that name, or the name of *fuliginosus*, before I had the

opportunity of making the correction, which, had Dr. Carpenter survived to finish his work, he would undoubtedly have done himself.

In the hurry of field-work, the specimens were confounded with young *T. albus*, and hence no observations on the living animal were made. Had attention been drawn to it, it might, doubtless, have been obtained throughout the Alentian chain, but no specimens occurred in the collections from more northern localities. Jeffreys states that the under edge of the girdle and the soft parts are yellowish white, tinged with flesh color; also that littoral specimens from Herm are larger than those found in deeper water. In Alaska it has been obtained only with the dredge.

The gills occupy a space corresponding to the posterior quarter of the foot; there are about eight or ten on each side. The mantle-edge is plain and thick. The veil is plain. The muzzle is rounded, with a little papilla at the posterior corner on each side.

Leptochiton alveolus.

Leptochiton alveolus (Sars MS.) Lovén, Ind. Moll. Lit. Scand. p. 27, 1846.
Not of Jeffreys, etc.

Lepidopleurus alveolus G. O. Sars, Moll. Reg. Arc. Nor. p. 110, t. 7, f. 3 a-i; t. I, f. 7 (good), 1878.

Hab.—Bergen, Lofoten, Finmark, 150–300 f. (Sars); Gulf of St. Lawrence, in 220 fathoms, between Cape Rosier and the S. W. point of Anticosti Island, Whiteaves! St. George's Bank, Gulf of Maine, 150 fathoms, U. S. Fish Com., 1872!

This extra-limital species is inserted here because of its possible relations with the next species, and also to call attention to the addition to our Northeast American fauna made by Mr. Whiteaves. It is a remarkably distinct species, and if typical examples had been examined by the authors who have referred it to *L. cancellatus*, it would seem unlikely that it would have been so referred.

Leptochiton Belknap.

Leptochiton Belknap Dall, Proc. U. S. Nat. Mus. p. 1, Jan. 1878.

L. t. elongatâ, valde elevatâ, dorsaliter angulatâ; albidâ plus minusve cinereo et nigroretâ; valvis elevatis, apicibus distinctis; mucrone centrali conspicuo; sculptura ut in L. alveolo, sed granulis in areis dorsalis sparsim et quineuncialiter dispositis. Valva posticâ sub apicè concavâ, posticè sinuatâ. Zona minimâ, spiculis tenuibus versus marginem munita. Lon. 10.0, Lat. 3.0 mm. Div. 90°.

Hab.—North Pacific Ocean, in lat. 53° 08' N., lon. 171° 19' W., at a depth of 1006 fathoms; black sand and shells. Brought up in the sounding-cup by Capt. Geo. E. Belknap, U. S. N., on the sounding expedition of U. S. S. Tuscarora in 1874, bottom temperature 35° 5 F. (Specimens obtained by H. M. S. Challenger in Balfour Bay, Royal Sound, Kerguelen Id., Southern Ocean, in 20–60 fms., for examination of which I am indebted to the courtesy of Rev. R. J. Boog Watson, are apparently identical with Capt. Belknap's species.)

This specimen much resembles *L. alveolus*, to which I at first referred it. A careful microscopical examination, however, shows differences which I am disposed to consider specific; but I have but one specimen, and others might show modifications in these particulars.

The differential characters are as follows: In *alveolus* the pustules are distributed evenly, closely, and in no pattern whatever, all over the surface. In *Belknapi*, they are more widely separated, and arranged in quincunx on the dorsum, the spaces seeming to radiate from the median dorsal line. In *alveolus*, the lateral areas are barely perceptible; in *Belknapi*, they are raised, concentrically rugose, and the pattern of the pustular arrangement is different and more irregular than that on the dorsum. In *Belknapi*, also, the girdle is very thin, narrow, and sparsely set with small pellucid spicules near the margin. The posterior mucro, or apex of the posterior plate, in *Belknapi*, is prominent, overhangs a shallow concavity, and from its point there diverge anteriorly four depressed lines, the outer two to the anterior lateral angles of the plate, the inner two equidistant from each other and the outer lines. Between these lines the plate is swelled, forming three rounded ridges, extending forward like the leaflets of a trefoil or clover. Nothing resembling this has been observed on any of the other species which have come under my notice.

The soft parts, in spirits, appear to resemble the other species compared with it. It is evidently adult.

It was certainly unexpected that a stone-clinging mollusk like a *Chiton* should reach such great depths as those from which this was obtained. In the same region, and at about the same depth, a *Cylichna* and a *Natica*, both apparently identical with certain Arctic species, were also obtained in the same way. Its enormous range in latitude, as indicated by the Kerguelen specimens, reminds one of the range of species in earlier geological times, and points out how relatively modern our littoral marine faunæ may be. It is not the only form common to the southern and northern oceans.

Extra-limital Species.

Leptochiton asellus.

Chiton asellus (Chemn. Spengl.) Lowe, Zool. Journ. ii, p. 101, pl. v, f. 3, 4, 1825.

Chiton cinereus Montague, Turton, and others, not of Linné.

? *Lepidopleurus cinereus* Sars, l. c. p. 112, pl. 7, f. 8 a-h, 1878; as of Linné.

Hab.—Northern seas of Europe; Lofoten Ids.; Greenland? (Moreh); not New England, as erroneously stated by authors. The *cinereus* of Linné, from his type, was a *Trahydermon*.

Leptochiton fuliginatus.

Chiton fuliginatus Ad. & Rve. Conch. Icon. pl. xxvi, f. 174, 1847.

Hab.—Korea, Belcher.

Leptochiton concinnus.

Leptochiton concinnus Gld. Otia, p. 117, 1860.

Hab.—Hakodadi, Japan; Stimpson.

Leptochiton nexus.

L. nexus Cpr. Suppl. Rep. Br. As. 1863, p. 650.

Hab.—California, Cooper.

Leptochiton internexus and var. rugatus.

L. internexus Cpr. MSS.

Hab.—California, Cooper, Canfield and Hemphill.

Hanleyia mendicaria.

Chiton mendicarius Mighels & Adams, Boston Journ. N. H. iv, p. 42, pl. iv, f. 8, 1842.

Hanleyia mendicaria Cpr. N. Engl. Chitons, l. c. p. 154, 1873.

Hab.—Casco Bay; Grand Manan, Stimpson; Portland Harbor, Me., U. S. Fish Commission. Deep-water specimens much larger than those from shallow water.

Hanleyia debilis.

Hanleyia debilis Gray, Guide, p. 186, 1857.

Chiton Hanleyi Bean, Brit. Mar. Conch. p. 262, f. 57, 1844.—Sars, l. c. p. 109, pl. 7, f. 5 a-i, 1878.

Hab.—British seas northward; Mageroe near North Cape, 25–300 f., Sars. Stellwagen Bank, Mass. Bay, 38 fathoms, gravel; U. S. Fish Com., 1878. Type of the subgenus. A recent addition to our North-east American fauna.

Hanleyia (?) abyssorum.

Chiton abyssorum M. Sars, MSS.—G. O. Sars, l. c. p. 109, pl. 7, f. 4 a-c, pl. I, f. 6 a-c, 1878.

Hab.—Bergen, Norway, 150–200 fathoms, Sars, l. c.

The teeth of this species as figured by Sars agree pretty well with those of *H. mendicaria*, but neither Prof. Sars' figures nor his description afford means for determining its generic position. The valves of the two specimens figured exhibit rather remarkable differences, and, this variation admitted, the question arises, Is this more than a gigantic form of the preceding?

Hanleyia tropicalis.

A large and beautiful species from the deep waters of the Gulf of Mexico is the only other recognized species of the genus, and will be described by the writer in the Report on the Deep-sea Dredgings made under the supervision of Prof. A. Agassiz, on the U. S. Coast Survey steamer Blake, in 1878.

ISCHNOIDEA.

Genus TRACHYDERMON Cpr.

Trachydermon Cpr. Suppl. Rep. Br. As. 1863, p. 649, as a subgenus of *Ischnochiton*, type

Chiton cinereus Lowe.

Lepidopleurus sp. auct.

> *Craspedochilus* G. O. Sars, l. c. p. 114.

Lophyrus sp. G. O. Sars, l. c. p. 114, not of Poli.

< *Boreochiton* G. O. Sars, l. c. p. 115.

Leptochiton sp. auct.

Char.—Laminæ inserentes acutæ, læves; valvæ extus et intus Ischnochitoni exacte simulans; zonâ non poriferâ, squamulis minutissimis lævibus confertissime granulatâ; branchiæ breves.

This name was originally proposed as a subgenus of *Ischnochiton* to include Gray's second section, "mantle scales minute, granular" (P. Z. S. 1847, p. 147; Guide, p. 182, 1857). In all other conchological characters, the group accords with that genus, but the animal differs in having the gills either entirely posterior or reaching forward from the tail only to about the middle of the foot, while in *Ischnochiton* and *Chiton* they travel to its anterior extremity. These characters indicate a transition between the Ischnoid and Leptoid Chitons by means of *Trachydermon* and *Tonicella*. Guilding called the radula of Chitons "Trachyderma"; but as the name has not been adopted, no inconvenience is likely to ensue. (Cpr. MSS.)



FIG. E.—Teeth of *Trachydermon cinereus* Lowe; after Lovén.

The genus is chiefly northern in its distribution. *Chiton marginatus* of authors (Pennant's species being indeterminable) and *C. cinereus* (Linn.) Lowe, are identical, according to Dr. Carpenter, the best authority on the subject, as well as Hanley and others. The "*Lepidopleurus*" *cinereus* of Sars is not the Linnean species, which is the type of *Trachydermon*, but a *Leptochiton*. His *Craspedochilus marginatus* (whether the *Chiton marginatus* of Pennant or not) is a *Trachydermon*, and not improbably the true *cinereus* of Linné, which has been recognized, not from the insufficient description in the Syst. Naturæ, but from his typical specimens, through the invaluable labors of Mr. Hanley.

Trachydermon ruber.

Chiton ruber Linn. S. N. ed. xii, p. 1107, 1766.—Lowe, Zool. Journ. ii, p. 101, pl. 5, f. 2, 1825.—Gould, Inv. Mass. p. 149, f. 24, 1841.—Forbes & Hanley, Brit. Moll. ii, p. 399, pl. lix, f. 6; AA, f. 6, 1853.—Hanley, Shells of Lin. p. 17, 1855.—Sowerby, Conch. Ill. Chiton, f. 103-4, 1839.—Reeve, Conch. Icon. Mon. Chiton, pl. 23, f. 175, 1847.—Jeffreys, Brit. Conch. iii, p. 224, 1865; v, p. 199, pl. lvi, f. 4, 1869.—Binney's Gould's Inv. Mass. p. 260, f. 523, 1870.

Chiton cinereus O. Fabr. Faun. Grönl. p. 423, 1780; not of authors, nor of Linn.; Ib. Dillwyn, Cat. Rec. Sh. p. 12, 1817.

Chiton minimus Spengler, Skrift. Nat. Selsk. iv, 1, 1797, fide Lovén, not of Gmelin and Chemnitz.

Chiton lævis Lovén, Ind. Moll. Lit. Scand. p. 28, 1846; not of Montague, Forbes and Hanley, etc.

Chiton lævis Pennant (probably), Brit. Zool. ed. iv, vol. iv, p. 72, pl. 36, f. 3, 1777 (bad).

Chiton latus Leach, Moll. Brit. p. 231, 1852, Dec., fide Jeffreys; not of Lowe, 1825.

Trachydermon ruber.

Chiton puniceus Couthouy (MS.).—Gld. Otia Conch. p. 5, 1846 (probably).

Leptochiton ruber H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

Chiton (Lepidopleurus) ruber Jeffreys, Brit. Moll. iii, p. 210, 1865.

Trachydermon ruber Carpenter, Bull. Essex Inst. v, p. 153, 1873.

Borochiton ruber G. O. Sars, Moll. Reg. Arc. Norv. p. 116, t. 8, f. 4 a-l, t. II, f. 3 a-c (imperfect), Junne, 1878.

Tr. t. mucrone mediano, satis elevato: *intus*, v. post. 9-11-, ant. 8-11-, centr. 1-fiss. laevi; dent. interdum solidioribus, interdum postice rugulosis; subgrundis modicis; sinu lato, planato; *zonâ* normali; branchiis submedianis. Lon. 25, Lat. 8 mm.

Hab.—Northern seas, widely distributed; whole coast of Norway, low water to 40 f. (Sars); Arctic and northern seas of Europe; Adriatic? (Olivi!); Spitzbergen, Iceland and Greenland, New England, Gulf of St. Lawrence and Labrador coasts; Tartary (Lischke); Kamchatka; and in Alaska from the Pribiloff Islands westward to Attu and southward to Sitka, low water to 80 fathoms, on stones and shells; probably also to Bering Strait northward. Two hundred specimens examined. ?Orange Harbor, Patagonia, as *C. puniceus*.

This shell is apparently smooth, as described by Forbes and Hanley, but under a high power appears finely reticulated, as observed by Jeffreys. Its color is very variable, being usually marbled red and whitish, like *Tonicella marmorea*, but the valves may be uniform dark red or nearly pure white. I have one specimen with the four central valves dark red and the rest white; one valve in a specimen is often dark red, while all the others are marbled. It is most likely to be confounded with *Tonicella marmorea* and some varieties of *T. lineata*, both of which have leathery girdles, while this species can almost always be determined by its farinaceous girdle, dusted with alternate red and whitish patches, the latter nearly opposite the sutures.

The identity or locality of Dr. Gould's specimen, described as *C. puniceus* Couthouy, and supposed by Dr. Carpenter to be probably the same as our northern species, seems questionable.

This species has been much confused by European authors, who have persisted in referring the Linnean name to *T. marmorea* Fabr., and resurrecting the indeterminate figure of Pennant for this species, though Mr. Hanley has determined the identity of the Linnean specimen with this species, and he did not possess the *marmorea*. The synonymy here quoted is only such as certainly belongs to this species.

Though not collected in a fresh state by me north of the Pribiloff Islands, I have little doubt that broken valves found in bird-dung at Plover Bay, near Bering Strait, are properly referable to this species. It is one of the most abundant Alaskan Chitons, and grows to the length of an inch.

The gill-rows extend forward for three-quarters the length of the foot, each row containing twenty to twenty-five branchiæ. The mantle-edge is very narrow and plain; there is no veil, and the muzzle is plain, some-

what produced behind into two corners. The eggs in part of the ovisac were well developed, and resembled the figure of the youngest stage given by Lovén. Anus median, inconspicuous, close to the mantle-edge. On each side of it, midway between it and the posterior ends of the gill-rows, is a fold containing the ovarian fenestræ. The number of openings varies from three to six in different individuals. They are linear, oblique, and close together. They are more strongly marked in this species than in any other *Chiton* I have examined.

Trachydermon albus.

Chiton albus Lin. S. N. ed. xii, p. 1107, No. 8, 1766.—Lowe, Zool. Journ. iii, p. 80, 1826.—Fabricius, Faun. Grönl. p. 422, 1780.—Sowerby, Conch. Ill. *Chiton*, f. 99, 100, 1839.—Gould, Inv. Mass. p. 150, f. 21, 1841.—Lovén, Ind. Moll. Lit. Scand. p. 27, 1846.—Middendorf, Mal. Ross. i, p. 120, 1847.—Forbes & Hanley, Brit. Moll. ii, p. 405, pl. lxii, f. 2, 1853.—Hanley, Shells of Lin. p. 17, 1855.—Stimpson, Sh. of New Engl. p. 28, 1851; Ib. Mar. Inv. Grand Manan, p. 22, 1853.—Jeffreys, British Conch. iii, p. 220, 1865; v, p. 199, pl. lvi, f. 3, 1869.—Binney's Gould, p. 263, f. 525, 1870.

? *Chiton oryza* Spengler, Skrift. Nat. Selsk. Bd. iv, Hft. 1, 1797 (fide Jeffreys).

Chiton aselloides Lowe, Zool. Journ. ii, p. 103, t. 5, f. 3, 1825.—Wood, Ind. Test. Suppl. pl. 1, f. 9, 1828.

Chiton sagrinatus Couthouy, Am. Journ. Sci. xxxiv, p. 217, 1838; Ib. Bost. Journ. Nat. Hist. ii, p. 82, 1838.

Leptochiton albus H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

C. (Lepidopleurus) albus Jeffreys, Brit. Conch. iii, p. 210, 1865.

Trachydermon albus Carpenter, New Engl. Chitons, Bull. Essex Inst. v, p. 153, 1873.

C. (Leptochiton) albus Mörch, Moll. Greenl. 147, 1875.

Lophyrus albus G. O. Sars, Moll. Reg. Arc. Norv. p. 114, t. 8, f. 2 a-b (probably not t. I, f. 9 a-b), June, 1878.

? *Lophyrus exaratus* G. O. Sars, l. c. p. 113, t. 8, f. 1 a-k, t. ii, f. 1 (bad).

? *C. minimus* Gmel. S. N. p. 3205, 1788. (Bergen.)

Tr. t. mucrone mediano, parum elevato; *intus*, v. post. 10-, ant. 13-, centr. 1-fiss.; dent. acutissimis, posticis interdum serratis; subgrundis spongiosis; sinu modico, undulato, haud angulato, lævi; *zonâ* squamulis solidioribus; branchiis medianis. Lon. 10, Lat. 5-6 mm. Div. variable.

Hab.—Arctic and boreal seas, Atlantic and Pacific. British seas south to the Isle of Man; Scandinavian seas, 10 to 100 fathoms (as *exaratus* to 200 fathoms); Spitzbergen; Iceland; Greenland, White Sea; Gulf of St. Lawrence; Massachusetts Bay; on the Pacific from the Arctic Ocean south to the Shumagins and west to Kyska and probably to Attu, low water to 80 fathoms, on stones and shells. Two hundred and forty-eight specimens examined.

The synonymy of this species might have been much enlarged under the old name of *Chiton albus*, but to no particular purpose. It is a well-known and characteristic Arctic shell. American and particularly deep-water Alaskan specimens are larger, finer, and better display the scales of the girdle than European specimens. Sars' *exaratus* would seem to be probably of this description.

It seems also to be more common to the westward. Its chief pecu-

liarity is that the central plates of the tail-valve are broken by serrations, and that the scales are large and gravelly.

The gills are twenty to twenty-five in number, the rows extending to the head. Mantle-edge narrow, plain. There is no veil, and the semi-circular muzzle is also plain. Anus terminal, papillate. Ovarian openings single, on each side, the posterior end of the gill-row passing behind them. The oviducts, as in some other species, could not clearly be made out. The ovisac or ovary is irregularly shaped and single.

The figure (pl. I, f. 9 a) strongly suggests that Prof. Sars, by inadvertence in selecting a specimen for examination of the radula, got hold of one of the extremely similar *Leptochitons*, since it does not resemble the radula of *T. albus*, of which I have examined both American and European specimens. On the other hand, the not particularly commendable figure of the radula of *T. exaratus* Sars looks more like *albus* than anything else.

? *Trachydermon lividus*.

Chiton lividus Midd. Mal. Ross. i, p. 124, pl. xiii, f. 3 a-g, 4, 1847.

Hab.—Sitka, Alaska Territory.

This species (and *C. scrobiculatus* Midd. from California) probably belongs to this genus, but the descriptions and figures are not sufficiently clear to have admitted of their identification up to the present time. The character most emphasized by Middendorf in *C. lividus* is a key-stone-like projection filling the anterior sinus between the two sutural laminae. The specimen on which the description was based was a very small and perhaps immature creature, with faint sculpture, somewhat recalling *Mopalia Hindsii*.

Extra-limital Species.

Trachydermon cinereus.

Chiton cinereus (Lin.) Lowe, Zool. Journ. ii, p. 99, 1825.—Forbes & Hanley, Brit. Moll. ii, 402, pl. lviii, fig. 1, 1853 (not of Sars).

Trachydermon marginatus Cpr. New Engl. Chitons, l. c. p. 153, 1873.

Craspedochilus marginatus Sars, l. c. p. 115, t. 20, f. 16 a-h, t. II, f. 2, 1878.

Hab.—British and Scandinavian seas, north to Lofoten, south to Vigor Bay, between tides and to the Laminarian zone. Type of the genus.

Trachydermon dentiens.

Chiton dentiens Gld. Otia, pp. 6, 242, 1862.

Ischnochiton (Trachydermon) pseudodentiens Cpr. Suppl. Rep. l. c. p. 649, 1866.

Hab.—Puget Sound and Vancouver Island.

The fact that the "teeth" are merely peculiar color-marks does not render it necessary to dispense with the original name of Dr. Gould.

Subgenus TRACHYRADSLIA Cpr. MSS.

Trachydermon, valvis centralibus bi- seu pluri-fissatis. Type *fulgetrum* Reeve.

Trachyradsia aleutica.

T. aleutica Dall, Proc. Nat. Mus. p. 1, Jan. 1878.

T. t. parvâ, rufocinereâ, oblongâ, fornicata, jugo acutissimo;

, but
state,
being
specimens
Russian
; the length
e. Mantle-
; muzzle is

submediano, apicibus prominentibus; ar. lat. inconspicuis; totâ superficie quincuncialiter minute reticulatâ; *intus*, v. ant. 16, post. 11, centr. 2-fissatâ; dent. parvis perspongiosis, late separatis; subgrundis spongiosis, curtis; sinu parvo; *zonâ* squamulis minutis obsitâ. Lon. 6, Lat. 3 mm.

Hab.—Kyska Harbor, Kyska Id. Constantine and Kiriloff Harbors, Amchitka Island, and Nazan Bay, Atka, in the Western Aleutians, at low-water mark, under stones on the beach, Dall! Fifteen examples.

This modest little species is of a dull livid purplish red, with an ashy tinge, especially on the narrow girdle. Except for the well-marked ridges of growth, it appears smooth, but possesses (like all Chitons) a fine reticulation, only visible under a magnifier. The lateral areas are not distinct, the back is very much rounded, and the valves well hooked in the median line. The substance of the valves from within appears remarkably spongy, as if rotten, or even like vesicular pumice, especially under the eaves. The anterior slits are marked by radiating lines of holes, though the teeth between them can hardly be made out. The posterior valve, however, has not this aid to counting, and in the general sponginess it is almost impossible to say how many teeth or denticles exist. It bears no marked resemblance to any other species of the region.

Genus TONICELLA Cpr.

Tonicella Cpr. Bull. Essex Inst. v, p. 154, 1873. Type *T. marmorea* Fabr.

Tonicia sp. Adams, Gray, Cpr. and others.

< *Borcochiton* G. O. Sars, Moll. Reg. Arc. Norv. p. 116, June, 1878.

Valvæ, mucro, laminae et sinus plerumque ut in *Ischnochitone*; *zonâ* ut in *Tonicia*, coriacea, lævis, seu sublævis: branchiæ mediæ.

The genus *Tonicia* Adams and Gray, to which the species of *Tonicella* have often been referred, has pectinated insertion-plates and ambient gills like the typical Chitons, while *Tonicella* has sharp plates and short rows of gills. The two groups also differ in their dentition. The major lateral of *Tonicella* is strongly tridentate; in *Tonicia* the cusp of the aratus is that of *Chiton* (typical) and *Corephium*. Prof. Sars appears to have been unaware of Dr. Carpenter's publication on the New England Arctic *Chiton*.
to Atlantic and for *Tonicella marmorea*.

The species *Chiton marmoreus* Fabricius, Faun. Grönl. 420, 1780.—Midd. Mal. Ross. i, p. 103, 1847; Sib. Reise, 182, 1851.—Forbes & Hanley, Brit. Moll. ii, p. 414, pl. lviii, f. 2, pl. lix, f. 4, 1853.—Jeffreys, Brit. Conch. iii, p. 227, 1865, v, p. 199, pl. lvi, f. 7, 1839.

water Alascon *ruber* Spengler, Skrift. Nat. Selsk. iv, p. 92, 1797.—Lovén, Ind. Moll. of the girdle and. p. 28, 1846; not of Linné.

be probably *Chiton levigatus* Fleming, Edin. Encycl. p. 113, t. vii; Brit. An. p. 290, 1828.—Reeve, Conch. Icon. Chiton, pl. 27, f. 179, 1847.

It seems *Chiton punctatus* Ström (Jeffreys)?, Acta Nid. iii, p. 433, t. vi, f. 14.

Tonicella marmorea.

- Chiton latus* Lowe, Zool. Journ. ii, p. 103, pl. 5, f. 6-7, 1825.—Sowerby, Conch. Ill. Chiton, f. 113, 1839.
Chiton fulminatus Couthouy, Bost. Journ. Nat. Hist. ii, p. 80, pl. 3, f. 19, 1838.—Gould, Inv. Mass. i, p. 148, f. 3, 1841.
Chiton pictus Bean, Thorpe's Brit. Mar. Conch. p. 264, pl. —, f. 56, 1844.
Chiton Flemingsi Leach, Moll. Gt. Brit. p. 230, Dec. 1852.
Tonicia marmorea H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.
Tonicella marmorea Carpenter, Bull. Essex Inst. v, p. 154, 1873.
Boreochiton marmoreus G. O. Sars, Moll. Reg. Arct. Norv. p. 116, t. 8, f. 3 a-l, t. II, f. 4 (not good), 1878.

T. t. elongatâ, valvis ut in "*Trachydermon ruber*" picturata; zonâ coriaceâ, expansâ, lævi; intus, v. post. 8-9, v. ant. 8-10, v. centr. 1-fisatâ; sinu angusto, altiore, lævi. Lon. 40, Lat. 24 mm.

Hab.—Aleutian Islands, 8-10 fms., rare; east coast of North America from Massachusetts Bay northward to Greenland; every part of the North Atlantic north of Great Britain, and as far south as Dublin Bay on the west and the shores of Holland on the east; in 5-100 fathoms, according to temperature.

This well known species has almost exactly such a color-pattern as *Trachydermon ruber*, and in dry specimens the pilose girdle of the latter is the most convenient means of distinction. A comparison of European with Greenland specimens shows that the latter are usually more elevated, and the posterior valve has usually seven slits instead of eight or nine. This form, of course, is the typical one; those from Europe may perhaps retain the varietal name of *T. latus* Lowe. The Alaskan specimens, as is often the case with mollusca of this region, are more like European than East American specimens, and in the fresh condition exhibit a very broad, smooth, yellowish girdle, sometimes as wide on each side of the valves as the whole width of the shelly part. Otherwise they agree with Norwegian specimens. The measurements given above are for the very largest; they average about an inch in length. It doubtless extends to the Arctic Ocean on the shores of Alaska, though all our specimens happened to come from the Aleutians.

Jeffreys states that this may be identical with *C. punctatus* Ström, but the name would be an evident misnomer, as it is in no way punctate, and the identification requires further confirmation.

Middendorf found a variation in the number of anterior slits, being five to seven, and in posterior slits six to nine, in all, in the specimens he examined, which came from the White Sea and Arctic coast of Russian Lapland.

An attempt has been made to identify this species with *C. ruber* Lin., but the examination of the Linnean Chitons by Mr. Hanley has left this theory no sound foundation, and it hardly requires further notice.

The gill-rows of this species extend forward three-quarters the length of the foot, and each contains twenty to twenty-five branchiæ. Mantle-edge plain, inconspicuous, very narrow. The margin of the muzzle is

puckered up in front, with the posterior corners produced into lappets. There is no veil. Oviducts not clearly made out. The ovarian openings are simple and close on each side of and a little behind the anus, from which a ridge extends in front of them on each side. But there appear, also, to be two openings in the vicinity of the fourth or fifth branchia from the posterior end of the gill-rows, one on each side. The contracted condition of the specimens, from the effect of the alcohol in which they were preserved, prevented a satisfactory confirmation of these appearances.

Tonicella lineata.

Chiton lineatus Wood, Gen. Conch. p. 15, pl. 2, f. 4-5, 1815.—Midd. Mal. Ross. i, p. 109, t. xii, f. 8-9, 1847.—Reeve, Conch. Icon. Mon. Chiton, pl. vii, f. 33, 1847.

Tonicia lineata H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.

Chiton (*Hamachiton*, *Stenosemus*) *lineata* Midd. Mal. Ross. i, p. 34.

Tonicella lineata Carpenter, MS.

T. t. mucrone antice mediano, satis elevato; intus, v. ant. 9-12-, v. post. 8-10-, v. centr. 1-fissatâ; dent. obtusioribus (t. jun. acutis), posticis curtioribus, vix interdum rugulosis; subgrundis curtis, spongiosis; sinu angusto, alto, levi, angulato; branchiis medianis; testâ externâ subelevatâ, tegmentum læve, arcis lateralibus vix distinctis; flavum aut fuscum, lineolis albis pictum, zonâ coriaceâ, oculo nudo lævis. Lon. 30, Lat. 15 mm. Div. 120°.

Hab.—From Bering Strait south, on both coasts; westward to Japan and the Okhotsk Sea; eastward to the Bay of Monterey, California, and including the whole Aleutian chain; low water to 60 fathoms. Two hundred and eighty specimens examined of the typical form.

The painting of this very characteristic species is very variable, even on different valves of the same individual. Nothing can appear more distinct than the coloration of typical specimens of some varieties, but in a large series the differences do not hold equally good. The number of slits is also somewhat variable, occasional abnormal or injured specimens having only six or seven slits in the tail-valve. But fine and normal specimens of both varieties show no more than individual variations.

Middendorf, while pointing out the distinctions between the following species and *T. marmorea*, appears to have overlooked the connection between the former and *T. lineata*, and his description does not always agree with his figures.

From *Tonicia lineolata* Sowerby, from South America, beside the internal generic characters, the exterior differs by the absence of punctures and raised granules at the sides.

T. submarmorea is further distinguished from *lineata* by the somewhat raised lateral areas, which are hardly perceptible in the present form. It is one of the handsomest Alaskan Chitons. The southern specimens, especially those from Monterey, generally have the yellow and brown lines margined with blue, which produces a peculiar color-effect.

The gill-rows extend forward two-thirds the length of the foot. They contain about twenty-seven branchiae on each side. The mantle-edge is very narrow, hardly distinguishable around the head. There is no veil. The edge of the muzzle is margined all around, and drawn into flaps at the posterior corners.

Tonicella submarmorea.

Chiton submarmoreus Midd. Bull. Acad. Sci. St. Pétersburg, iv, No. 8, 1846; Mal. Ross. i, p. 98, 1847; Ib. Sib. Reise, p. 178, pl. xiv, f. 7-10, xv, f. 7-8, 1851.

Chiton insignis Reeve, Conch. Icon. Mon. Chiton, pl. xxii, No. 149, f. 148, 1847.

T. t. ut in forma præcedente, sed testâ externâ ex rosea flavoque alba, maculis flammulisque sed rufis, sed albis pictâ; tegmentum zonæ læviusculum, nitidulum, flavum aut fuscum pictum.

Hab.—Japan and the Okhotsk Sea, Aleutian Islands to Sitka and Fuca Strait. It has not been found north of the Aleutians or south of Washington Territory.

In the description of this form, Middendorf, in distinguishing it from *T. marmorea*, seemed to overlook its relations to *T. lineata*, from which, for some time, I was indisposed to specifically separate it. The peculiar color of the valves is reproduced sporadically on some valves of *T. lineata* in occasional specimens; though these may be due to hybridization. The dentition, elsewhere figured, indicates, however, that the two forms are specifically distinct. The soft parts are very similar to those of *T. marmorea* in every respect except that the openings near the anus were absent. The specimen was a male, and the structure of the spermsac recalled that of *Aemæa*. Some of these differences may be sexual; at all events, the subject requires investigation from living specimens.

Tonicella saccharina.

Tonicella saccharina Dall, Proc. Nat. Mus. p. 2, Jan. 1878.

T. t. parvâ, oblongâ, totâ superficie saccharinâ rufo et albescente pictâ; mucrone submediano, inconspicuo; ar. lat. inconspicue elevatis, ar. dors. sanguinosis, æque quineuncialiter lente reticulatâ; v. ant. 10-11-, v. post. 8-10-, v. centr. 1-fissatâ; dent. parvis, spongiosis; sinu parvo; subgrundis spongiosis, mediocris; zonâ coriacea ut in *Tonicellæ* aliis. Branchiis mediis. Lon. 6.5, Lat. 4 mm.

Hab.—Aleutian and Shumagin Islands; Kyska, Unalaska, and Koniushi, 3 to 13 fathoms on stones! St. Paul, Pribiloff Ids., 15 fathoms. Seven specimens examined.

This interesting little species has the lustre of rock-candy, through which the microscopic reticulation is barely perceptible. It is marked, in all the specimens obtained, by the red wine colored dorsal areas contrasted with a waxy white color of the lateral areas, rendering its recognition easy. The girdle is dark, leathery, narrow, slightly pubescent,

and furnished at its extreme margin with a fringe of fine spiny hairs or spicules, as in *T. marmorea*.

? *Tonicella Sitkensis*.

Chiton Sitkensis Midd. Bull. Acad. Sci. St. Pétersb. vi, p. 121, 1846; Mal. Ross. i, p. 112, t. xiii, f. 1-2, 1847.

Tonicia Sitkensis H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.

Not *Chiton Sitkensis* Reeve, Conch. Icon. sp. 55, 1847.

?*T. t. externa depressa*; tegmentum læviusculum, areis lateralibus indistinctis, sub lente sparsim granulosum, rubicundum; limbi læviusculi epidermis zonalis submicroscopio stroma exhibet spinulis latentibus erectis munitum; v. ant. 8-, v. post. 10-, v. centr. 1-fissata; branchiæ posticæ, paræ, no. circ. 24. Lon. 10, Lat. 6 mm. Div. 130°.

Hab.—Sitka, one specimen (Midd.).

The above species described by Middendorf, if not a variety of one of the others, has not yet been identified or collected by any other naturalist. His description differs very much from his figures, while the anterior teeth are figured as grooved outside; if correct, an unusual character. It is said to be nearest to *T. submarmoreus*, and may well be a young specimen of one of its numerous varieties.

Genus SCHIZOPLAX Dall.

Schizoplax Dall, Proc. Nat. Mus. p. 2, Jan. 1878.

Tonicia sp. II. & A. Adams.

Schizoplax Cpr. MS. (subgenus of *Tonicella*).

Testa et zona Tonicellæ simulans; valvæ centrales sulco jugali mediano, antico argute incisæ; branchiæ subambientes.

For this remarkable form, which is distinguished from all other known Chitons by the median slit in all the central valves, I propose to adopt the MS. name suggested by Dr. Carpenter on Middendorf's figures, raising its value, however, to the rank of a genus. The specimens obtained by us appear to be the first obtained by any one since the original specimens of Middendorf.

Schizoplax Brandtii.

Chiton Brandtii Midd. Bull. Acad. Sci. St. Pétersb. vi, p. 117, 1846; Mal. Ross. i, p. 123, 1847.

Chiton (*Hamachiton*, *Stenoscomus*) *Brandtii* Midd. Sib. Reise, p. 174, t. xv, f. 1-6, 1851.

Tonicia Brandtii H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.

Schizoplax Brandtii Dall, Proc. Nat. Mus. p. 2, Jan. 1878.

S. t. ovali, longiori, angustiori, satis elevatâ; jugo rotundato; olivaceo-fusca, cæruleo seu strigatâ, seu maculatâ seu nebulosâ; sæpe irregulariter castaneo; mucrone centr. irregulariter subplanato; v. post. omnino satis regulariter excurvatâ; ar. jug. nonnisi colore definitis, ar. lat. vix definitis, totâ superficie læviore, sub lente conspiciue quine. granu-

latâ; zona angusta, olivaceo-cinereo maculatâ, confertim spinulis minutis ornata, oculo nudo sublævis; submicroscopio epidermis dorsalis pubescens, stroma spinulis rarioribus latentibus erectis; mucro indistinctis in summa tamen linea mediana valvarum intermediarum superne sulcus decurrit linearis, longitudinalis, argute incisus; sinu jugali modico, alto, haud laminato, conspicue spongiosa, subgrundis minimis, maxime spongiosis; v. ant. 11-, post. 11-, centr. 1-fiss. Branchiæ circ. 22, subambientes. Lon. 16, Lat. 5 mm. Div. 140°.

Hab.—Shantar Bay, Okhotsk Sea, Midd.; Aleutian Islands eastward to Sitka Harbor, low water to 12 fathoms on stones and shells; Dall! Ninety-three specimens examined.

This very remarkable species is very prettily marbled with olive, chestnut, and blue; the girdle generally dark olive, dashed with ashy spots and in fine specimens having a pubescent appearance. The slit is occupied by a cartilaginous substance of a dark brown color, most visible from within. The branchiæ appear to reach nearly to the head. It is quite possible that it may reach as far south as Puget Sound.

The soft parts are yellowish white. The gill-rows extend three-fourths of the length of the foot forward from their posterior termination, and each contains about twenty-two branchiæ. Mantle-edge thick, plain; veil small, plain. Muzzle small, plain, with two large squarish lappets at the posterior corners. The supposed oviducts open on each side through a small rounded papilla in the vicinity of the third or fourth branchia counting forward, and between the line of the gill-row and the side of the foot.

Genus CHÆTOPLEURA Shuttleworth.

Chatopleura Shuttlew. Bern. Mitth. Juni 1853. Type *Chiton Peruvianus* Lam.

<*Chatopleura* H. & A. Adams, Gen. Rec. Moll. i, p. 475, 1854.

<*Acanthopleura* Gray, P. Z. S. 1847, p. 67.

Testa Ischnochitoni similis; zonâ plus minusve pilosâ. Branchiæ ambientes.

Chætopleura Hartwegii.

Chiton Hartwegii Carpenter, P. Z. S. 1855, p. 231.

Trachydermon Hartwegii Cpr. Suppl. Rep. Br. Assoc. 1863, p. 649.

C. t. colore olivaceo, cinereo seu rufo-fusco seu cupreo-viridi, sæpe eleganter maculoso; intus, intense cæruleo-viridi; mucrone mediano satis elevato; valvis singulis tumentibus, eleganter arcuatis, apicibus conspicuis, suturis marg. distinctis; ar. diag. haud nisi costis tumentibus subobsoletis discernendis; totâ superficie super granulis minimis, sub lente solum distinguendis, granis parvis ubique sparsis; super ar. diag. et v. term. granis majoribus irregulariter verrucosis; intus v. post. 9-12-, ant. 10-11-, centr. 1-fissatis; dent. solidis, obtusis, interdum subru-

gulosis, valde separatis; subgrundis spongiosis, parum extantibus; sinu alto, lato, planato. spongioso, haud laminato; paginâ internâ callosâ; zonâ fuscâ, minutissime granulosâ, inter granulas setis pellucidis minimis hue et illuc decurrentibus. Lon. 25, Lat. 16 mm. (Cpr. MS.)

Hab.—Columbian Archipelago, probably reaching the southern borders of Alaska, and southward to Magdalena Bay, Lower California. Forty specimens examined.

This species having been originally described from imperfect specimens, I insert Dr. Carpenter's amended diagnosis. It has not occurred in our collections, but being abundant in the Vancouver region, doubtless occurs in Southeastern Alaska. It is an aberrant species, and at some time may require to be separated from the genus to which Dr. Carpenter and myself have provisionally referred it.

Chætopeura Nuttallii.

Chiton Nuttallii Cpr. P. Z. S. 1855, p. 231.

Trachydermon Nuttallii Cpr. Suppl. Rep. Br. Assoc. 1863, p. 649.

C. t. mucrone satis planato; intus v. post. 11-, ant. 8-, centr. 1-fissatâ; aliter ut in *C. Hartwegii* formatâ.

Hab.—With the last, also probably in Alaska.

All the specimens examined appear to differ from *C. Hartwegii* in the broad non-swelling valves, squared at the sides, and not beaked or waved. It may yet prove merely a variety. The characters of the mantle and interior are aberrant, as in the last species.

Genus ISCHNOCHITON.

Ischnochiton Gray §*, P. Z. S. 1847, pp. 126-7.

Lepidopleurus Ad. Gen. Rec. Moll. i, 471, 1854.

Testa tenuior; lam. insert. regulares, acutæ, nec pectinatæ nec serratæ; subgrundæ majores; sinus plerumque lævis; zona squamosa, squamis plerumque striatis; branchiæ elongatæ. (Cpr.) Type *I. longicymba* Quoy.

The main character of this genus, which includes by far the largest number of species of any single group of Chitons, consists in the row of sharp smooth insertion-teeth, surrounded by more or less projecting eaves, as first described by Dr. Carpenter in the Mazatlan Catalogue (p. 194), and in the scaly girdle. Dr. Carpenter has divided the group by its minor characters into the following subgenera:

1. *Stenoplax* Cpr *C. limaciformis* Sowerby.
Body elongate. Scales elongate, chaffy, striated, irregular, and crowded.
2. *Stenoradsia* Cpr. *C. magdalenensis* Hinds.
Like *Stenoplax*, with numerous side-slits.
3. *Ischnoplax* Cpr *C. pectinatus* Sowerby.
Like *Stenoplax*, but with occasional large scales rising above the rest, and a multitude of short striated bristles. Mucro raised, subposterior.

4. *Heterozona* Cpr. *H. cariosa* Cpr.
Body elongate; two kinds of rather solid, striated scales.
5. *Ischnochiton* (restricted) Cpr. *C. longicymba* Quoy.
Scales transverse, flattened, somewhat imbricated, generally striated.
6. *Ischnoradsia* Cpr. ex Shuttleworth *C. dispar* Sowerby.
Scales striated. Central valves with many slits.
7. *Lepidopleurus* Cpr. Ex *C. Mertensi* Midd.
Scales solid, imbricated, smooth.
8. *Lepidoradsia* Cpr. *C. australis* Sowerby.
Similar to the last, with many slits in central valves.

The only Alaskan species of the restricted subgenus, so far as known, is the following form.

***Ischnochiton interstinctus*.**

Chiton interstinctus Gould, Moll. U. S. Expl. Exp. p. 322, pl. 27, f. 423, *a, b*, 1852.
C. (Leptochiton) interstinctus Gould, Otia, p. 230, 242, 1832.
Callochiton interstinctus H. & A. Adams, Gen. Rec. Moll. i, p. 471, 1854.
Trachydermon interstinctus Cpr. Suppl. Rep. Br. As. 1833, p. 649.
Ischnochiton interstinctus Cpr. MS. 1871.

I. t. mucrone antice mediano, satis elevato; *intus* v. post. 12-, ant. 10-, centr. 1-fiss.; dent. acutis; subgrundis modicis; sinu lato, planato; *zonâ* squamulis subovalibus, tenuissime striatis. Lon. 17, Lat. 7 mm. Div. 110°.

Hab.—Sitka Harbor, 12 fathoms, mud and gravel! south to Monterey and the Santa Barbara Islands, California. Eighty-seven specimens examined.

This is a modest little species of a dark red color, mottled with light about the jugum. The riblets are somewhat broken into tubercles by the lines of growth. It appeared to be very abundant at Sitka in the locality where it was found. There are no other species likely to be confounded with it in this district.

The gill-rows are nearly as long as the foot. The muzzle is produced into lappets at the corners. No data in regard to the fenestræ could be obtained from the dry specimens.

***Ischnoradsia trifida*.**

Trachydermon trifidus Cpr. Suppl. Rep. Br. As. 1833, p. 649; Proc. Phil. Acad. Nat. Sci. 1835, p. 60.

I. satis magnâ, satis elevatâ, regulariter ovali; rufo-castaneâ, pallidiore et intensiore maculatâ; jugo acutiore, gothico; mucrone mediano, planato; totâ superficie vix minutissime granulatâ; ar. centrali lineis transversis, jugo perpendicularibus circ. VIII altissime punctatis; ar. lat. valde definitis, costis obsoletis II–IV, interdum ad interstitiis punctim-depressis; *intus*, pagina internâ albido-carneâ, radiis II rufo-purpureis ab umbonibus planatis divergentibus; v. post. 13-, v. ant. 13-, centr. 2-fissatis, dentibus acutis interdum ad margines serratis, interdum extus striatis sed interdum normaliter lævibus; subgrundis conspicuis sub-

spongiosis; sinu minore, laminato, laminâ atroque latere et interdum in medio fissatâ; zonâ squamulis perparvis, solidioribus, irregulariter instructis lævibus, instructâ; branchiis fere ambientibus, per valvas VI posticus continuis. Lon. 40, Lat. 26 mm. Div. 135°.

Hab.—Sitka, Port Etches, 9–18 fms., gravel, rare; south to Puget Sound. Six specimens examined.

This rare and fine species is not particularly handsome, being of dull and livid colors, but is peculiarly characterized by the straight transverse ribs on the dorsal areas, with spongy interspaces, and by the pretty regular division of the lateral areas into three well-marked radiating costæ, which are separated in the insertion-plate by two fissures. No other species of the region resembles this in sculpture. Muzzle with a pectinated margin in front produced into rounded lappets at the corners. Gill-rows as long as the foot, containing each 28–35 branchiæ. Veil absent. Mantle-edge plain, narrow. There is a small spherical lump on each side of the girdle just behind the posterior ends of the gill-rows, which are turned out toward the girdle and widely separated behind. The anus is large, median, and crenate, opening on the upper part of the hinder end of the foot. No ovarian openings could be detected, and the species presents some peculiarities which call for further research with more material.

Subgenus LEPIDOPLEURUS s. s. Cpr.

Lepidopleurus Mertensii.

Chiton Mertensii Midd. Bull. Ac. Sci. St. Pétersb. vi, p. 118, 1846.

Chiton (*Pheuchiton*, *Hamachiton*, *Stenosemus*) *Mertensii* Midd. Mal. Ross. p. 34, 125, pl. xiv, f. 1–3 a–h, 1847.

Leptochiton Mertensii H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

L. t. colore rubido, interdum intensiore nebuloso; mucrone subcentrali, haud elevato; *intus* v. term. 9–12-, centr. 1 fiss.; dent. acutis; subgrundis majoribus; sinu lato, planato, lævi; *zonâ* rubidâ seu pallidiore, squamis ovoideis, nitentibus, lævibus vix regulariter confertissime imbricatâ. Lon. 20, Lat. 6 mm. Div. 100°.

Hab.—Sitka and vicinity, south to Monterey, Cal. Many specimens examined.

Middendorf's description and figures of this shell do not agree well together. Its fine red color, sharp and prominent sculpture, usually free from erosion or nullipore, and beautifully shining and regular scales, render this one of the most attractive and easily recognized of the Alaskan Chitons. There are no others in that region likely to be confounded with it. It rarely shows a white valve or a dash of white on some of the valves.

The soft parts of this species are whitish. The anus is on a papilla. Mantle-edge narrow, granulose, forming on each side behind the last branchia a rounded lump or tumor. Near this the ovarian openings were thought to be detected. Muzzle semicircular, cornered behind on

each side. No veil. Gill-rows three-quarters as long as the foot, each containing about forty branchiæ.

(In *Lepidoradsia australis*, the gill-rows were found to extend the whole length of the foot, and to contain forty-seven branchiæ in each. Mantle-edge plain, thin; muzzle plain, semicircular, without a veil; the ovarian openings situated close on either margin of the anus.)

ACANTHOIDEA.

Genus NUTTALLINA Cpr. MS.

Loricâ elongatâ, valvis antice projectis; mucro posticus, elevatus; laminae acutæ, leves, (nisi v. post.) elongatæ; v. centrales bifissatæ; sinus haud laminatus, planatus; zonâ spinosâ.

From *Acanthopleura* this genus differs in the smoothness of the sharp teeth, in their great length and Radsoid slitting; in the thrown-back mucro, which often projects beyond the margin; in the throwing forward of the rest of the shell, as in *Katherina*, and in the deep spongy flat sinus which interrupts the sutural laminae. The name is given in honor of the late Thomas Nuttall, Esq., once professor of natural history at Harvard College, and the original discoverer of the typical species, as well as many others of the shells and plants of California. (Cpr.)

Nuttallina scabra.

Chiton scaber Reeve, Conch. Icon. Mon. Chiton, pl. xvii, f. 106, 1847.

Chiton californicus (Nutt. MS.) according to Carpenter.

Not *Chiton californicus* (Nutt. MS.) according to Reeve.

Acanthopleura scabra Cpr. Suppl. Rep. Br. Assoc. 1863, p. 649.

N. t. mucrone postico, sed haud terminali, maxime trans marginem posticum elevato; v. post. 7-8-, v. ant. 10-11-, centr. 2-fissatis; dent. acutis, lævibus, (nisi postice) prælongis, antice valde projectis; valvis centralibus dent. post. minoribus; subgrundis parvis, haud sulcatis; sinu altissimo, lato, planato, spongioso, haud laminato; zonâ latâ crassâ; spinis testaceis curtioribus densissime obsitâ. Lon. 36, Lat. 10 mm.

Hab.—Vancouver district, south to California, probably in the southern islands of Alaska; at and above high-water mark, in crevices of the rocks; at Monterey abundant.

This singular species, not yet obtained from Alaska, but which will probably be found there, like some Litorinas, seems habitually to prefer positions where it can at most be reached by the spray in storms, on exposed headlands, where the breeze comes in damp and cool from the sea. The pointed valves overlap each other so much that when the creature is curled up they project from the girdle, giving a pectinated outline, unusual in Chitons. The valves are almost always eroded, even the prominent mucro is often hollowed out, and the sculpture can rarely be seen except in young specimens. The color is grayish or brownish, with whitish streaks; the girdle has the aspect of dead brownish-black moss, sometimes with ashy spots at the sutures.

ORDER DOCOGLOSSA.

Suborder ABRANCHIATA.

Family LEPETIDÆ.

Genus LEPETA Gray.

Lepeta Gray, P. Z. S. 1847, p. 168.—Dall, Am. J. Conch. v, 1869, p. 140.

Subgenus LEPETA Dall ex Gray.

Lepeta Dall, Mon. Fam. Lepetidæ, Am. J. Conch. v, 1869, p. 141.

Lepeta cæca.

Patella cæca O. F. Müller, Prodr. Zoöl. Dan. 1766, p. 237; Ib. Zoöl. Dan. i, p. 12.

Lepeta cæca Gray, P. Z. S. 1847, p. 168.—Dall, l. c. p. 141, pl. 15, f. 4. (Type.)

Hab.—In Alaska, in 23 fathoms, off the Sea Horse Islands, near Point Barrow, Arctic Ocean north from Bering Strait (Smith! 3 specimens). Elsewhere, northern seas of Europe and Eastern North America generally, 10–100 fathoms (Sars); Massachusetts Bay northward, in America. In Europe northward from Danish waters; on the Norwegian coast; the Hebrides, etc.

This species has not been found, though reported, erroneously, south from Bering Strait on the Pacific side. Such references refer to *L. (U.) concentrica*. Jeffreys found it in six hundred and ninety fathoms off Holsteinborg in Greenland, and it ranges from that depth to a few fathoms. That it has a curved, nearly spiral, deciduous nucleus when very young, was announced by me in 1869, and is confirmed by Dr. Jeffreys in his Report on the Mollusca of the Valorous Expedition. It is the *Patella candida* of Couthouy, *P. cerea* of Möller, and probably the *Lepeta Franklini* of Gray MSS.

Subgenus CRYPTOBRANCHIA Dall ex Midd.

Cryptobranchia Midd. (pars), Sib. Reise, p. 183, 1851.—Dall, Mon. Lepetidæ, l. c. 1869, p. 143.

The name *Cryptobranchia* was previously used by Gray, Fleming, and Deshayes for different groups of mollusks of family or greater value, but has in none of these cases been used or adopted by other naturalists, and hence was not preoccupied for the group of Middendorf.

Cryptobranchia concentrica.

Patella (Cryptobranchia) cæca, var. β *concentrica*, Midd. Sib. Reise, p. 183, pl. xvi, f. 6, 1851.

Cryptobranchia concentrica Dall, l. c. p. 143, pl. 15, f. 2 a–f.

Lepeta cæcoides Cpr. Suppl. Rep. Br. As. 1833, pp. 603, 651.

Hab.—North Japan, Stimpson! Schrenck!, eastward throughout the Aleutians, along the southern coast of Alaska (Dall!), British Columbia

(Fisher!) to Puget Sound, W. T. (Swan and Kennerly!). Abundant from low water to eighty fathoms on stones and shells, sometimes attaining the length of an inch, but usually about four-tenths of an inch long. Five hundred and twenty-seven specimens examined.

This is the largest and most abundant species of the family. In it, beside differences in dentition, the apex is simply pointed or blunt, not deciduous, as in the typical *Lepeta*. The sculpture is usually faint, but sometimes raised in beautiful concentric frills, from which the name was derived. Small specimens from slight examination have been quoted as *L. cava* by authors. It has not yet been found north of the Aleutians.

C. concentrica var. *instabilis*.

? *Cryptobranchia instabilis* Dall, l. c. p. 145, pl. 15, f. 6.

I am now convinced that the provisional name which I applied to this singular form is only of varietal value. It seems, from later specimens, to be a form which, from living on the stalk of *Nereocystis*, has become peculiarly arcuated and greatly thickened, much like *Acmæa instabilis*, which has the same habit. It has only been found at Sitka in small numbers, dead, in 10-15 fathoms.

Cryptobranchia alba.

C. alba Dall, l. c. p. 145, pl. 15, f. 3 a-d, 1869.

Hab.—Plover Bay, E. Sib., Dall! Seniavine Straits, Stimpson! Akutan Pass, Aleutian Islands, Dall! Dead on beach. Alive at sixteen fathoms, gravel. Twenty-four specimens examined.

This species appears to fill the gap between the distribution of *L. cava* and *C. concentrica*. It is easily distinguished from the latter by its smooth surface and rounded apex and back, beside anatomical characters. It rarely reaches nearly an inch in length, and is of the purest whiteness.

Extra-limital Species.

Subgenus **PILIDIUM** Forbes.

Pilidium Forbes, Athenæum, Oct. 6, 1849, p. 1018.—Forbes & Hanley, Brit. Moll. ii, p. 440, 1849; not of Middendorf, Sib. Reise, p. 214, 1851.—Dall, l. c. 1869 (synonymy, etc., in full).

Iothia Gray, not Forbes, 1854 (cf. Dall, l. c. 1869).

Tectura Jeffreys, 1865, not of Gray (1847), nor of authors.

Scutellina Chenu (pars), Sars, not of Gray, 1847.

Pilidium fulvum.

Patella fulva O. F. Müller, Prodr. Zool. Dan. p. 227, 1776.

Pilidium fulvum Forbes, Athenæum, l. c. Oct. 6, 1849.—Dall, l. c. 1869.

Pilidium rubellum Stm. Checklist Sh. N. Am. E. Coast, No. 312, 1865.

Tectura fulva Jeffreys, Br. Conch. iii, p. 250, 1865.

Patella forbesii J. Smith, Wern. Soc. Mem. viii, p. 107, pl. ii, f. 3.

Scutellina fulva G. O. Sars, Moll. Reg. Arct. Norv. p. 122, 1878.

Hab.—Northern and Arctic seas of Eastern America and Europe; doubtfully reported from the Adriatic, where, if it be correctly identified,

it is probably the remnant of a polar colony, like that in the Gulf of Lyons. It ranges from five to one hundred and fifty fathoms.

This species, like *Cryptobranchia*, has a rounded non-spiral apex. When the Arctic shores of Alaska are more carefully searched, it may turn up there; but it does not seem to be a common species anywhere.

The name *Pilidium* has been used for a stage in the larva of certain invertebrates, but not as having an assured standing in systematic nomenclature. I see no reason, therefore, why it should be replaced by any other. It is hardly necessary to point out that it does not belong even to the same family as the *Tectura* of most authors, though erroneously called *Tectura* by Adams and others. It was sent by Mörch, under the name of *Patella rubella* Fabr., to Dr. Stimpson, which led him and the writer to erroneously unite that species (which is an *Acmæa*) with the present one in 1865 and 1869. To Prof. Sars is due the credit of pointing out the true place of the *P. rubella*. Clark speaks of finding the fry entangled in the mucus of the foot, but this can hardly be more than an accident.

Suborder PROTEOBRANCHIATA.

Family ACMÆIDÆ Cpr.

Acmæidæ Dall, l. c. p. 237, 1871.

Genus ACMÆA Eschscholtz.

Acmæa Esch. Appendix to Kotzebue's New Voyage around the World (Dorpat, 1828), London reprint, vol. ii, p. 350, 1830.—Dall, l. c. p. 237, 1871. Type *A. mitra*.

Having shown by evidence which cannot be successfully controverted, that the name of *Acmæa* has precedence in time of application over *Tectura* Aud. (*Tectura* Gray), no apology is necessary for following the lead of Forbes, Woodward, Hanley, Philippi, and Carpenter, in adopting the prior designation. Its very extensive synonymy will be found in my paper above quoted.

Subgenus ACMÆA Dall ex Eschscholtz.

Acmæa Dall, Am. J. Conch. vi, p. 241, 1871. Type *A. mitra* Esch.

Erginus Jeffreys, Ann. Mag. Nat. Hist. Mar. 1877, p. 231.

Tectura Sars, Moll. Reg. Arct. Norv. p. 121, 1878.

Acmæa mitra.

A. mitra (Esch.) Rathke, Zool. Atlas, v, p. 18, No. 1, pl. xxiii, f. 4, 1833.—Dall, l. c. p. 241, 1871, pl. 14, f. 1.

Hab.—Pribiloff Islands, Bering Sea, westward to Kyska in the Aleutians, and eastward and southward to Sitka, Oregon, and the coast of

California as far south as the Santa Barbara Islands, from low-water mark to eighty fathoms, Dall! Seventy-four specimens examined.

I showed in 1871 that this species has nothing in common with the genus *Scurria*, to which it has often been referred, except a very superficial resemblance of form of the shell. It is not very abundant anywhere. The partially striated variety *tenuisculpta* Cpr. has not been found in Alaska. *A. mitra* varies from white to pink or green, and is frequently covered with regular nodules or papillæ of nullipore, when it is *A. mammillata* of Eschscholtz. It is the most unmistakable shell of the genus, the members of the restricted subgenus *Acmæa* presenting a singular contrast with one another in respect to their shelly covering.

Acmæa insessa.

Patella insessa Hinds, An. Nat. Hist. x, p. 82, pl. vi, f. 3.

Acmæa insessa Dall, l. c. p. 244, pl. 14, f. 3.

Hab.—Sitka Harbor (one specimen), southward to San Diego, California, Dall! Thirty specimens, mostly from the beaches. It seems very rare in Alaska.

Acmæa instabilis.

Patella instabilis Gould, Proc. Boston Soc. Nat. Hist. ii, p. 150, 1846.

Acmæa (?) *instabilis* Dall, l. c. p. 245.

Hab.—Sitka, Fort Wrangell, very rare; southward to Vancouver (abundant), and Monterey, Cal. (rare); dead on beaches.

This species, like the last, lives on the stems of the giant fuci common to this coast, and I have never seen a fresh specimen with the soft parts. But a radula extracted from one by Mr. H. Hemphill, and kindly sent to me, enables me to say with confidence that it is a typical *Acmæa*.

Extra-limital Species.

Acmæa rubella.

Patella rubella Fabr. Fauna Grönl. p. 386, 1780.

Pilidium fulvum (pars) Dall, Am. J. Conch. v, part iii, 1869.

Tectura (*Erginus*) *rubella* Jeffreys, Ann. Mag. Nat. Hist. p. 231, Mar. 1877.

Tectura rubella G. O. Sars, l. c. p. 121, pl. 8, f. 5 a-b, pl. ii, f. 11, 1878.

Hab.—Greenland, Fabr., Möller, Jeffreys; Norway, in Finmark, Sars; 5 to 40 fathoms.

The shell is generally of a much more brilliant orange color than the *Pilidium*, with which it has been confounded. I am not sure that some very young and minute specimens of Limpets found in the Aleutian Islands may not belong to this species, but they are too small to determine their relations with any certainty.

It is unfortunate that Prof. Sars, while recognizing in part the characters which I used to separate this subgenus from *Collisella* in the genus *Acmæa* in 1871, should have applied the name *Tectura* to the true *Acmæas*, and used *Acmæa* for *Collisella*, in his very valuable work on the Arctic Mollusks of Norway; thus exactly reversing the original arrangement and inadvertently transgressing the laws of nomenclature.

Acmæa virginea.*Patella virginea* Müller, Prodr. Zool. Dan. p. 237, 1776.*Acmæa virginea* Hanley, Br. Marine Conch. p. xxxii, 1844.*Tectura virginea* of authors.*Acmæa virginea* Dall, Am. J. Conch. vi, p. 243, 1871, q. v.

This species extends from Iceland and Northern Norway south to the Azores, but does not reach the shores of America. It ranges from low-water mark to sixty fathoms. The *Ancylus Gussoni* of Costa, which has been united with this species, belongs to the *Siphonariidæ*.

Subgenus COLLISELLA Dall.

Collisella Dall, Proc. Bost. Soc. Nat. Hist. Feb. 1871. (*Acmæa pelta* Esch.)*Acmæa* Sars, Moll. Reg. Arct. Norv. p. 120, 1878.

This group is distinguished by slight but constant external differences and by dental characters from the typical *Acmæas*. It comprises most of the Alaskan species as well as many from other parts of the world.

Acmæa (*Collisella*) *pelta*.*A. pelta* Esch. Rathke, Zool. Atlas, v, p. 19, 1833.—Dall, l. c. p. 246, pl. 14, f. 6, 1871.*Tectura cassis* von Martens, Malak. Blätt. xix, p. 92, pl. 3, f. 9-10, 1872.

Hab.—Aleutian Islands and the southern coast of Alaska south and east to the Santa Barbara Islands, Cal., between or near tide-marks. Five hundred and ninety specimens examined from my own collection and many thousands in the field.

The numerous names which the variations of this species have received, and some account of its varietal forms, have been given by me in the paper alluded to. Only one of these forms, *A. pelta* var. *nacelloides* D. (l. c.) seems sufficiently constant to deserve a separate name. In the examination of hundreds of these most variable shells, one's notions of the characters sufficient among them to constitute a species or variety become so enlarged as to receive little sympathy from those who know the group in question from a few specimens on a museum tablet. Constant field and museum experience for more than twelve years has only confirmed my conviction of the propriety of the views of Dr. Carpenter, on the west coast species, which have been expressed in his various publications. It is true that in selecting from simultaneously published names, if he had known at first all that we now know, perhaps a different selection might have seemed more judicious; but I agree with Dr. v. Martens that any change, now that those selections have become history, would be most objectionable, and not to be countenanced.

The strongly ribbed variety of *A. pelta*, which Dr. v. Martens has so well figured, and has identified with the *cassis* of the Zool. Atlas, appears to be the same. However, the Martensian shell (which I have represented by some magnificent examples) is so closely connected, specimen by specimen, with others nearly smooth, that I cannot admit that it requires or should receive a separate name, even if the identity were

proven. Other varieties, almost without number, might be selected from the series before me, which taken singly seem quite as distinct, and it seems preferable to err, if at all, in the matter of naming mere variations, on the side of conservatism.

Acmaea (*Collisella*) *persona*.

Acmaea persona Eschscholtz, Rathke, l. c. p. 20, pl. xxiv, f. 1-2, 1833.—Dall, l. c. p. 250, pl. 14, f. 8.

Tectura digitalis von Martens, l. c. p. 93, t. 3, f. 3-4.

Tectura persona Ib. l. c. p. 95, f. 5, 6.

Hab.—Adakh Id., Aleutians (one specimen), Shumagins, Cook's Inlet (Martens), Port Etches, and southward to California as far as the Santa Barbara Islands, between and sometimes above tide-marks. One hundred and twenty-eight specimens collected.

The varieties of this shell are often very beautiful, and, taken by themselves, apparently well marked; but in a large series these differences disappear in the general interchange of characters in a way which is impossible to fully realize without a very large series. The synonymy will be found in my paper above cited, and contains several variations much more striking than those separated by von Martens.

Acmaea (*Collisella*) *testudinalis*.

Patella testudinalis Müll. Prodr. Zool. Dan. p. 237, 1766.

Collisella t. Dall, l. c. p. 249, pl. 14, f. 13, 1871.

This well-known form was supposed by me to be pretty easily separable from *C. patina* Esch. in 1871, but the result of several years' additional study of the region about the Aleutian Islands has rudely shaken that cherished belief. There is a pretty constant difference in the relative size and proportion of the teeth on the radula of large and fully grown specimens; but of other characters (with seven hundred and thirty specimens before me of all sizes, ages, and localities) I find it impossible to formulate any. Dr. Carpenter at one time thought them distinct, but a re-examination by him resulted in his confessing his inability to distinguish one species from the other by the shells, and I can confidently assert that the exterior of the animals affords no characters whatever. Indeed, some of the varieties of what we have called typical *patina* are more different from the type than *testudinalis* can possibly claim to be. Specimens of adult *patina* from Sitka and the Aleutian Islands are indistinguishable from specimens of *testudinalis* of the same size from Eastport, Maine. It has been found impossible to rightly assort a mixed lot by every one who has tried it. I am therefore forced to divide the species as follows:

Collisella testudinalis var. *testudinalis*.

Hab.—In Alaska from the Arctic Ocean southward (on both sides of Bering Sea) to Sitka. On the eastern coast of America from Long Island Sound to the Arctic Ocean, Cumberland Gulf (Kumlein), and South Greenland. In Europe, it extends from the English Channel

northward to Finmark. In Asia, according to Schrenck, it reaches Yesso and the Tartarian coast. "Mexico" is quoted, ex B. M. tablet, by Jeffreys; of course due to ballast or some mixture of specimens or labels. North of the Pribiloff group, in Bering Sea, it appears to be the sole form of the genus.

C. testudinalis var. *patina*.

Acmæa patina Esch. Rathke, l. c. p. 19, pl. xxiv, f. 7-8, 1833.

C. patina var. *normalis* sive *pintadina* (Gld.) Dall, l. c. p. 247, pl. 14, f. 4, 1871.

Tectura patina Martens, l. c. p. 93, pl. 3, f. 7-8, 1872.

Hab.—Aleutian Islands, eastward and southward on the Alaskan side to San Diego, California. Six fathoms to high-water mark; usually between tides.

The characters assigned to *patina* by most naturalists are those of southern specimens (which were described as *Patella pintadina* by Gould), nineteen-twentieths of the specimens in museums having come from California.

In northern waters these distinctions are more or less obsolete, but on a comparison of Californian with Massachusetts Bay specimens it is very easy to draw the line between them, and this holds good for individuals as far as the Aleutians, but not for the generality.

C. testudinalis var. *alveus*.

Hab.—Sitka northward and elsewhere with the typical form in Atlantic seas, a variety formed the residence of the individual on a narrow frond of seaweed or *Zostera*. *Tectura alveus* of authors.

C. testudinalis var. *Cumingii*.

Patella Cumingii Reeve; Dall, l. c. p. 248.

Hab.—From the Pribiloff Islands southward with var. *patina*. Commonest toward Cook's Inlet, rare at the northern extreme of range and southward of Vancouver Island. Usually near low-water mark, and most frequently in isolated rocks washed by the surf.

C. testudinalis var. *ochracea*.

Dall, l. c. as var. *patina*, p. 249, pl. 17, f. 35.

Hitherto found chiefly in California, but reported from Vancouver Island by Hepburn; rare.

My largest specimen of var. *patina* is two and three-quarters inches long; another is an inch high. Every imaginable fluctuation in color, elevation, smoothness or striation, width in proportion to length, &c., may be found somewhere in the series before me. Yet, after uniting *patina* to the older form, there is a certain *facies* which distinguishes the species from any other with tolerable readiness. It is the commonest of all the species in Alaska and over the whole northwest coast of America.

Acmæa (Collisella) peramabilis.

A. peramabilis Dall, Proc. Cal. Acad. Sci. iv, p. 302, Dec. 1872.

Hab.—Shumagin Islands, low water to six fathoms. Six specimens.

This most lovely species is most like some reddish varieties of *patina*, but none of them approach it in color, while numerous other features testify to its distinctness; which I have, as yet, seen no reason to doubt. It appears to be exceedingly local and rare, but all the specimens present a very uniform appearance.

Acmæa (Collisella) sybaritica.

Collisella sybaritica Dall, Am. J. Conch. l. c. vi, p. 257, pl. 17, f. 34 a-c, 1871.

Hab.—Pribiloff Islands southward on the west to Hakodadi, Japan (Stm.), throughout the Aleutians, and on the southeast to Chirikoff Island, and perhaps Kadiak; from lowest water to twenty-five fathoms. One hundred and ninety specimens examined.

This beautiful little species, of which only a few specimens were known when it was described, has since been found over a very large area, and usually in rather deep water for the genus. It seems to represent *Acmæa virginea* on the Pacific side, though not very similar to it in appearance. The largest specimen found is an inch in length, but they are always very much flattened.

Acmæa (Collisella?) triangularis.

Nacella (?paleacea var.) triangularis Cpr. Proc. Cal. Acad. Sci. iii, p. 213, 1866.

Collisella? triangularis Dall, l. c. p. 254, 1871.

Hab.—Sitka to Monterey, Cal.; dead on beaches.

This species varies from narrow, high, and elongated to rounded and rather flat, according to the place of its growth, as on a frond or leaf of some marine plant like *Zostera*, or on a flat unlimited surface. It appears very rare in Alaska, only one specimen having been collected there, but is tolerably common on the coast of California. I have never, however, been able to get it in the living state, so as to definitely decide its generic place.

***Acmæa (Collisella?) apicina* n. s.**

Testâ parvâ, conicâ, tenui, rotundatâ, plus minusve elevatâ; albidâ seu isabellina, apice erecto, luteo; intus luteo, albido, sen fusco, lævi; extus striulis incrementis subobsoletis munito. Lat. 5 mm.. Lon. 6 mm., Alt. 4 mm.

Hab.—Pribiloff Islands on the north, the Aleutians from Amchitka eastward, extending to the Shumagins; twenty-two specimens, all dead except two, one of which was found at low water and the other dredged in seventy fathoms.

Among other small shells obtained from time to time on the beach or in the dredge, occasional specimens occurred which at first were supposed to be the young of *A. mitra* or pale specimens of *A. sybaritica*.

After eliminating some of these, there remained, after careful study, a residue, which do not appear to coincide in character with any described species. They are small, thin, conical, with a blunt, erect apex marked by a light yellow spot, the rest of the exterior white or faintly yellowish, marked by obsolete lines of growth, smooth, or nearly so, but not polished. Within, fresh specimens are yellowish, whitish, or orange-colored, and quite polished. The outside is almost always covered with nullipore. The chief characters are the rounded base, regularly conical and yellow spotted apex, with a thinner shell than young *A. mitra*.

Fam. PATELLIDÆ.

Genus NACELLA Schumacher.

Nacella (Schum.) Dall, l. c. p. 274, 1871. Type *N. mytilina* Gm.

***Nacella* ? *rosea*.**

Nacella ? *rosea* Dall, Proc. Cal. Acad. Sci. iv, p. 270, pl. 1, f. 2, Oct. 1872.

Hub.—Dead on exposed ocean beaches at Kyska Island, Aleutians, and Simeonoff Island, Shumagins. Alive on fuci off shore? Forty-five specimens obtained, all dead.

This exquisite little rose-leaf of a shell exactly resembles the type of the genus *Nacella* in form, and is the only one of the so-called *Nacellæ* of the northwest coast which has not been proved to be an *Acmæid*. It is only provisionally referred to this family, and may prove, like the others, non-patelloid when the animal becomes known.

In this connection it may be of interest to quote the words of Eschscholtz in describing the genus *Acmæa*,* words which at one time were partially discredited, but which the march of science has proved literally true:—"Here" (at Sitka) are found "six species of a genus which from its simple unwound shell would be immediately taken for a *Patella*; the creature, however, closely resembles the *Fissurella*, with the difference that only one gill is visible in the fissure over the neck. It is remarkable that on the whole northwest coast of America, down to California, no *Patella*, only animals of the genus *Acmæa* were to be met with."

It will be noticed from the preceding documents that in the Alaskan region fourteen species of Limpets, not counting the innumerable varieties, and twenty-six or seven species of *Chitonida*, are known, most of which have rewarded our researches, and a part of which are absolutely new. Additional species may be expected to recompense additional and more minute research; but that the chief members of these groups native to this region have been determined there is little reason to doubt.

* From the English reprint, published in the spring of 1830, but dated by the author at "Dorpat, Jan. 7, 1828." I found the first edition in the Royal Library at Stockholm. It passed the censor in March, 1829, was issued in the winter of 1829-30, and is dated on the title-page 1830.

Extra-limital Species.

Genus PATELLA Linné.

Patella Lin. S. N. ed. x, 1758.—Dall, l. c. p. 266, 1871 (full synonymy).

Patella vulgata.

P. vulgata Lin. Syst. Nat. ed. xii, p. 1258.—Dall, l. c. p. 268, pl. 15, f. 23, 1861.

British and North European seas from the Mediterranean to the Northern Lofoten Islands, between tides. Type of the genus.

Genus PATINA Leach.

Patina Leach, MSS. 1819; Moll. Gt. Brit. 1852, p. 223.—Dall, l. c. p. 279.

Helcion Jeffreys, not Montfort.

Nacella H. & A. Adams, Sars, not Schumacher.

Patina pellucida.

Patella pellucida Lin. S. N. ed. xii, p. 1260.

Patina pellucida Leach, l. c. p. 224, 1852.—Dall, l. c. p. 280, pl. 16, f. 20, 1871.

British and North European seas, northward to Lofoten; in most cases living on the stalks and fronds of large fuci.

DECEMBER 16, 1878.

LIST OF THE FIGURES.

PLATE I.

1. *Leptochiton cancellatus* Sby., Alaska: *a*, major lateral from above.
2. *Hanleyia mendicaria* Mighels & Adams, Casco Bay, Maine.
3. *Trachydermon ruber* Lowe, Greenland: *a*, major uncinus from below.
4. *Trachydermon albus* Lin., Alaska.
5. *Tonicella lineata* Wood, Alaska.
6. *T. marmorea* Fabr., Greenland.
7. *T. submarmorea* Midd., Alaska.
8. *Schizoplax Brandtii* Midd., Aleutian Islands.
9. *Chætopeura gemma* Cpr., California.
10. *C. ? Hartwegii* Cpr., California.

PLATE II.

11. *Maugerella conspieua* Cpr., California.
12. *Stenoradsia magdalenensis* Hinds, California.
13. *Stenoplax limaciformis* Sby., west coast of Mexico.
14. *Ischnochiton regularis* Cpr., California.
15. *Ischnochiton Cooperi* Cpr., California.
16. *Ischnochiton interstinctus* Gld., Alaska.
17. *Ischnoradsia trifida* Cpr., Alaska: *a*, cusp of major lateral from above.
18. *Lepidopleurus Mertensii* Midd., Alaska: *a*, rhachidian *in situ*.
19. *Lepidoradsia australis* Sby., Port Jackson, Australia.
20. *Callistochiton palmulatus* Cpr., California.

PLATE III.

21. *Pallochiton lanuginosus* Cpr., California.
22. *Chiton articulatus* Sby.: *a*, side view of rhachidian tooth.
23. *Ischnoplax pectinatus* Sby., West Indies.

24. *Chiton Stokesii* Brod., Peru: *a*, major uncinus from below.
25. *Chiton Cumingii* Frembly, Chili.
26. *Chiton assimilis* Reeve, West Indies.
27. *Tonicia elegans* Frembly, Chili.
28. *Acanthopleura spinigera* Sby., Aden.
29. *Lucia confossa* Gld., Patagonia: *a*, minor lateral; *b*, major uncinus.
30. *Corephium echinatum* Sby., South America.

PLATE IV.

31. *Nuttallina scabra* Reeve, California.
32. *Phacellopleura porphyritica* Reeve.
33. *Placiphora Carmichaelis* Gray, South America.
34. *Mopalia Wossnessenskii* Midd., Alaska.
35. *Mopalia ciliata* Sby., Alaska: *a*, minor lateral.
36. *Placiphorella velata* Cpr., California: *a*, minor lateral from inner side.
37. *Katherina tunicata* Wood, Alaska.
38. *Acanthochiton aricula* Cpr., California.
39. *Acanthochiton spiculosus* Rve., West Indies.
40. *Macandrellus (costatus?)* Ad. & Angas, Australia.

PLATE V.

41. *Cryptoconchus monticularis* Quoy, New Zealand.
42. *Amicula Pallasii* Midd., Alaska.
43. *Amicula vestita* Sowerby, Massachusetts Bay. (*Emersonii* Couth.)
44. *Cryptochiton Stelleri* Midd., Alaska.
45. *Chitonellus fasciatus* Quoy, Gaspar Straits: *a*, minor lateral from outer side.
46. View of the anterior end of a Chiton from below: *a*, muzzle; *b*, veil; *c*, fringe or true mantle-edge; *d*, lower surface of girdle; *e*, end of row of "ambient" branchiæ; *f*, lower surface of foot.
47. Development of larval Chiton, *Trachydermon cinereus* Lowe (*T. marginatus* Jeffreys), after Loven: *a*, embryo, in the egg; *b*, dorsal view of larva, showing the commencement of the grooves for the valves; *c*, lateral view of the same; *d*, larva further advanced, the valves beginning to be formed; *e*, the same, from beneath, showing the foot and eyes at the sides of the head; *f*, dorsal view of an older individual, showing the diminished size of the anterior tuberculate lobe or head.

NOTE.—The figures of dentition are diagrams, not portraits, designed to indicate the form of the individual teeth rather than the superficial appearance of the undisturbed radula. While the photographic relief process, by which these plates were obtained from the original drawings, has not been as satisfactory in its results as was at first hoped, it is believed that, inartistic as they may appear, the figures are more characteristic than if they had been redrawn and subjected to the artistic modifications of a professional draughtsman unacquainted with the subject.

ON THE IDENTITY OF *Euchalarodus putnami*, GILL, WITH
Pleuronectes glaber, (STORER) GILL, WITH NOTES ON THE
HABITS OF THE SPECIES.

By TABLETON H. BEAN.

In October, 1864, Prof. Gill described a remarkable new genus of pleuronectoids under the name of *Euchalarodus*,* from specimens sent to him from Salem, Massachusetts, by Prof. F. W. Putnam, which has ever since been considered an anomaly among flat-fishes. *Euchalarodus putnami* is little known except through the excellent description of its founder, the few specimens collected being shared by only two museums—that of the Peabody Academy, Salem, and the U. S. National Museum. In contrasting *Euchalarodus* with other American genera of Pleuronectinæ, Prof. Gill says:† “From the American genera *Pseudopleuronectes*, Blkr., *Liopsetta*,[‡] Gill, *Myxopsetta*, Gill, and *Limanda*, Gottsche, it is at least distinguished by its squamation, oculo-scapular ridge, nostrils, dentition and structure of the dorsal and anal fins. It is most nearly related to *Pleuronectes*,[§] with which it agrees in the free tongue, but the more perfect union and the triangular form of the wholly united lower pharyngeal bones, the want of an anal spine, and, above all, the movable teeth and scarcely perforate anterior nasal tubes will especially distinguish it, not only from that genus, but from any other known one. So anomalous indeed are the characters of dentition and nostrils, that only after I had felt each tooth could I be convinced that they were really normally movable, and that the condition was not the effect of disease, an idea which, improbable as it was, occurred to me. The remaining genera of the subfamily of Pleuronectinæ—*Platichthys*, Grd., *Parophrys*, Grd., *Lepidopsetta*, Gill, *Glyptocephalus*, Gottsche, *Microstomus*, Gottsche, *Pleuronichthys*, Grd., *Hypsopsetta*, Gill, *Heteroprosopon*, Blkr., and *Clidoderma*, Blkr.—are equally or still more distinct than those already mentioned.”

From the above and from an examination of the types it is evident that we should compare *Euchalarodus* with *Pleuronectes*. This I have done, employing for the purpose the types of the description of *Euchalarodus putnami*, Gill, and specimens of *Pleuronectes glaber*, (Storer) Gill, and *Pleuronectes platessa*, Linn. My investigations force me to the conclusion that these are all members of one and the same genus, *Pleuronectes*, since they possess in common the characters of that genus as defined by Bleeker, as well as those by which *Euchalarodus* was differentiated from *Pleuronectes*. *Euchalarodus*, by the way, has an anal spine.

* Proc. Acad. Nat. Sci. Philad. 1864, pp. 221 and 222.

† Op. cit. p. 222.

[‡] The *Platessa glabra* of Storer, for the accommodation of which this genus was proposed, has since been referred to the genus *Pleuronectes* (Art.) Bleeker, by Prof. Gill.

[§] *Pleuronectes* (Art.) Bleeker, Verslagen en Mededeelingen der koninklijke Akademie van Wetenschappen, Deel xiii, Amsterdam, 1862, pp. 427, 428.

Take the most salient characters of the genus *Euchalarodus*—the movable teeth and scarcely perforate anterior nasal tubes—the same conditions may be observed in *Pleuronectes glaber* and *P. platessa*. *Euchalarodus Putnami*, in fact, is the male of *Pleuronectes glaber*, and differs from it only in having more of its scales ciliated. The young are like the adult male in this respect. Had all the examples of *Pleuronectes platessa* exhibited movable teeth, it would have led to the belief that *Euchalarodus* after all might be applied to the species of *Pleuronectes* with movable teeth, but one of them has the teeth firmly fixed, another has some in the upper jaw movable, and a third has all the teeth reclining and freely movable. The explanation of this condition is yet to be sought.

The materials used in this examination are as follows:

5368.	Types (2) of <i>Euchalarodus Putnami</i> .	Salem, Mass.	Putnam.	(Teeth of larger movable.)
20910.	<i>Pleuronectes glaber</i> , ♂.	Portland, Me.	Tarleton H. Bean.	(Teeth movable.)
20920.	" "	♂ and ♀.	Salem, Mass.	C. F. Putnam. (Teeth movable.)
20954.	" "	(7 young *).	Bucksport, Me.	C. G. Atkins. (Teeth fixed.)
14657.	" "	(half-grown).	Portland, Me.	Summer, 1872. (Teeth fixed.)
14659.	" "	" "	" "	" "
14662.	" "	" "	" "	" "
14666.	" "	" "	" "	" "
14667.	" "	" "	" "	" "
14669.	" "	" "	" "	" "
14673.	" "	" "	" "	" "
14677.	" "	" "	" "	" "
14678.	" "	" "	" "	" "
14679.	" "	" "	" "	" "
14681.	" "	" "	" "	" "
14682.	" "	" "	" "	" "
14683.	" "	" "	" "	" "
14684.	" "	" "	" "	" "
14685.	" "	" "	" "	" "
14658.	" "	(adult ♀).	" "	" "
14661.	" "	" "	" "	" "
14663.	" "	" "	" "	" "
14654.	" "	" "	" "	" "
14635.	" "	" "	" "	" "
14671.	" "	" "	" "	" "
14672.	" "	" "	" "	" "
14674.	" "	" "	" "	" "
20873.	" "	(1 ♂ and 2 ♀).	" "	Dec. 15, 1877. (Teeth movable.)
20954.	" "	(3 spent ♀).	Bucksport, Me.	Mar. 4, 1878. (Teeth transitional.)

It will be seen that the teeth of the adult male and female are freely movable only during the breeding season, and that those of the young are fixed.

10029.	<i>Pleuronectes platessa</i> .	Kiel.	Dr. Möbins.	(Teeth fixed.)
10061.	" "	Christiania, Norway.	R. Collett.	(Teeth movable.)
21175.	" "	France.	Mus. d'Hist. Nat. Paris.	(Some teeth of upper jaw movable.)

* The longest of these is 140^{mm} in length. All have rough scales.

As before remarked, *Euchalarodus Putnami* is not even specifically distinct from *Pleuronectes glaber*, a species well distinguished from *Pleuronectes platessa* by its more continuous and pronounced oculo-scapular ridge, its radial formula, and other characters. The synonymy of *Pleuronectes glaber* is as follows:

***Pleuronectes glaber*, (Storer) Gill.**

Platessa glabra, STORER, Proc. Bost. Soc. Nat. Hist. i, 1843, p. 130; Mem. Amer.

Acad. viii, 393, pl. xxxi, fig. 1; Hist. Fishes Mass. 1867, p. 199, pl. xxxi, fig. 1.

—PUTNAM, Bull. Essex Inst. vi, 1874, p. 12.

Liopsetta glabra, GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

Pleuronectes glaber, GILL, in Rep. U. S. Com. Fish and Fisheries, 1873, p. 794.—

GOODE & BEAN, Amer. Jour. Sci. and Arts, xiv, 1877, p. 476; xvii, Jan. 1879, p. 40.

Euchalarodus Putnami, GILL, Proc. Acad. Nat. Sci. Phila. 1864, pp. 216 and 221;

in Rep. U. S. Com. Fish and Fisheries, 1873, p. 794.—PUTNAM, in Storer, Hist. Fish. Mass. 1867, p. 279.—GOODE & BEAN, Amer. Jour. Sci. and Arts, xiv, Dec. 1877.

The smooth plaice, *Pleuronectes glaber*, (Storer) Gill, was described by Storer from the coast of Massachusetts. Specimens from Salem Harbor, November 15, 1872, are in the Museum of Peabody Academy. The U. S. Fish Commission found it very abundant, during the summer of 1872, in Bluelight Cove, Caseo Bay, Maine, and they seined the young at Salem in August, 1877. Mr. C. A. Putnam of Salem took specimens at Beverly Bridge in January, 1858,—the specimens which formed the types of *Euchalarodus Putnami*. I add the following from my notes:

December 15, 1877, ten specimens were found among the flat-fishes (*Pseudopleuronectes americanus*) in Washington Market, which had come from Portland, Me., by way of Fulton Market, New York. Nine of these were gravid females, and one was a male, which was smaller than the average of the females, and had rougher scales.

December 18, 1877, thirteen specimens were again taken from among the flat-fishes, nearly all of them from one stand. All were females, most of them gravid. The weight of the largest was 23 ounces avoirdupois; of its spawn, 7 ounces. The ovary of the blind side extended from the origin of the ventral to the end of anal ($7\frac{1}{4}$ inches). The ovary of the eyed side was $6\frac{3}{16}$ inches long. The eggs were one-thirtieth of an inch in diameter. The length of the fish was $13\frac{1}{2}$ inches. The smallest of the thirteen weighed $3\frac{3}{4}$ ounces, and contained eggs about as large as those of the preceding. There is considerable variation in the extent of the ventrals.

January 10, 1878, two fresh specimens were received through Mr. C. F. Putnam, from Salem, Mass., a male and a gravid female. The weight of the male is 5 ounces; of the female, 21. They are called "fool-fish" in Salem, because they will bite even at a rag. It is said that they appear about Christmas in numbers, and remain only a short time. They probably come into the harbor to spawn. There is no record of the oc-

currence of the species farther south than Salem, though from the external resemblance of the male and the young to *Pseudopleuronectes americanus*, it might easily be overlooked. "Christmas-fish" is another name for the smooth plaice at Salem.

U. S. NATIONAL MUSEUM, December 31, 1878.

THE IDENTITY OF RHINONEMUS CAUDACUTA (STORER) GILL WITH
GADUS CIMBRIUS, LINN.

By G. BROWN GOODE and TARLETON H. BEAN.

In 1848, Dr. David Humphreys Storer described a gadoid fish from Massachusetts Bay, to which he gave the name *Motella caudacuta*.* In 1863, a special genus, *Rhinonemus*,† was framed for it by Professor Gill, and the species has since been called *Rhinonemus caudacuta* (Storer) Gill. After a critical examination of European and American specimens, we are convinced that this species is separated by no valid characters from that described by Linnaeus under the name *Gadus cimbrius*.‡ A specimen of the latter in the National Museum from Christiania, Norway (No. 10058, R. Collett), agrees precisely with specimens of *R. caudacuta*, so-called, from Massachusetts Bay (collected in 1877 and 1878 by the U. S. Fish Commission), in proportions of body and fins, shape of head, numbers of fin-rays, and coloration. The radial formula is misstated by Storer, who gives it D. 53, A. 48, and this evidently misled Professor Gill, who noted that *Rhinonemus caudacuta* was "very closely related to the *Motella cimbria* of Europe," but who evidently had at the time of naming the genus never seen a specimen of the species from either side of the Atlantic. Storer's description of color, cited by Gill as separating his species from that of Linnaeus, applies very well to the latter: "the posterior margin of the second dorsal and anal fins, as well as the edge of the caudal fin of a dark slate color."

The radial formulæ of four specimens studied stand as follows:

10058	(Christiania).	D. 50.	A. 44.	P. 16.	V. 5.
21918	(Massachusetts Bay).	D. 49.	A. 43.	P. 16.	V. 5.
21919	(Massachusetts Bay).	D. 51.	A. 44.	P. 16.	V. 5.
21919 a	(Massachusetts Bay).	D. 52.	A. 45.	P. 16.	V. 5.

The genus *Motella* was not proposed in proper form until the publication of the second edition of Cuvier's Règne Animal in 1829, although in its French form—*Les Mustèles*—it was applied by Cuvier to the genus in 1817. The name of Risso, published in his "Europe Meridionale" in 1827, must therefore be used as Professor Gill has indicated.§

* Proc. Bost. Soc. Nat. Hist. iii, 1848, p. 5.

† Proc. Acad. Nat. Sci. Phila. 1863 (Sept.), p. 230.

‡ Systema Naturæ, ed. 12, 1763, p. 440.

§ L. c. p. 241.

The sole character which separates *Rhinonemus* from *Onos* is the presence of a nasal cirrus, a character to which we are unwilling to allow more than a subgeneric value. We believe that the species should be called *Onos cimbricus* (Linn.), but are willing to accept provisionally the name *Rhinonemus cimbricus*. We have examined numerous specimens which purported to belong to *Ciliata argentata* (Reinh.) Gill, and have found them in every case to be the young of this species, for small individuals of *R. cimbricus* are found swimming at the surface, although the adult fishes inhabit only the deeper parts of Massachusetts Bay. English ichthyologists now regard *Ciliata* as the larval form of "*Motella*," and if this be not the case, we doubt if this genus has ever been observed in the Western Atlantic. The National Museum has specimens of *Onos mustela* (Linn.), *Onos tricirratus* (Bloch), and *Onos maculatus* (Risso); the specific individuality of the latter two seems very doubtful, as well as that they are distinct from *Onos ensis* (Reinh.) Gill, described from the coast of Greenland.

The synonymy of *Onos cimbricus* is given below.

Onos (Rhinonemus) cimbricus (Linnæus) Goode & Bean.

Gadus cimbricus, LINNÆUS, Syst. Nat. ed. xii, 1766, p. 440.—LACÉPÈDE, Hist. Nat. Poiss. ii, 1801, p. 442.

Motella cimbrica, BELL, Canadian Naturalist and Geologist, iv, 1859, p. 209.—GÜNTHER, Cat. Fishes Brit. Mus. iv, 1862, p. 367.—GILL, Proc. Acad. Nat. Sci. Phila. 1863, p. 241.

Enchelyopus cimbricus, SCHNEIDER, Bloch's Systema Ichthyologiæ, 1801, p. 50, pl. ix.

Motella cimbrica, NILSSON, Prodr. Ichth. Scand. p. 48; Skand. Fauna, iv, 1855, p. 587.—YARRELL, Hist. Brit. Fishes, 2d ed. 1841, ii, p. 274.

Motella caudacuta, STORER, Proc. Bost. Soc. Nat. Hist. iii, 1848, p. 5; Mem. Amer. Acad. Sci. 1867, p. 411; Hist. Fishes Mass. 1867, p. 183.

Rhinonemus caudacuta, GILL, Proc. Acad. Nat. Sci. Phila. 1863, p. 241; Cat. Fishes E. Coast N. Am. 1873, p. 18.—GOODE & BEAN, Am. Journ. Sci. and Arts, xiv, Dec. 1877, p. 476.

WASHINGTON, December 31, 1878.

CATALOGUE OF THE BIRDS COLLECTED IN MARTINIQUE BY MR. FRED. A. OBER FOR THE SMITHSONIAN INSTITUTION.

By GEORGE N. LAWRENCE.

After completing the exploration of Grenada, Mr. Ober left there the fore part of April and visited the island of Tobago, where he remained for more than two months, and did not arrive in Martinique until the beginning of July, remaining there until the latter part of August. His collection was made "from July 9th to August 20th." It consists of ninety-one specimens.

He gives an interesting account of the island, which, with his other observations, are indicated by quotation-marks.

"Sketch of Martinique.

"Martinique is the largest of the Lesser Antilles, being about 50 miles in length and containing, it is estimated, about 380 square miles.

"The surface is very uneven, the interior being one grand region of hills and mountains. The highest of these is Mount Pelée, northwest of the principal town, St. Pierre, and in the northwestern part of the island. It is over 4,000 feet in height; it is a volcano, and has emitted smoke and ashes within thirty years; now, however, there are no signs of an eruption. There are in all 5 or 6 extinct volcanoes. Here may be seen in great perfection those picturesque *pitons*, or peaked mountains—conical peaks. One group in the interior shows itself in great beauty from Fort de France. Mineral and warm springs occur in various parts of the island, and some of the rivers are of good size.

"To one glancing at a map of the island—with its high mountains, dark ravines, gloomy gorges, tracts of elevated table land, numerous bays and streams—this would seem the promised land for birds. Situated, too, midway the volcanic chain, it should possess birds that no other island could boast. Yet I have found it otherwise, and in Dominica, only 30 miles of latitude further north, I obtained more species and found birds in greater profusion. This is owing to at least two causes—the hand of man being manifest in both—1st, the dense population (the island having a population of not less than 130,000); 2nd, to the thorough cultivation of all cultivable land. From the coast to the hills, and even up the mountain sides, cane is grown; and when that is not practicable, are the provision grounds of the negroes. The rest is pasture land, trees, and rocks. I found great difficulty in getting a place of abode outside the city, and it was a week or two after my arrival before I could get even a floor to sleep upon. There are no hotels outside of St. Pierre and Fort de France, save at the two warm springs, and no inns or hostelries.

"Had it been practicable, I would have made a camp in the mountains; but this I could not do, as I did in Dominica and St. Vincent. Notwithstanding all this, I secured a roof and a room in a little hamlet in the mountains called Morne Ronge, and from there made excursions to Morne Calebasse, Morne Balisier, Mountain Pelée, and Champ Flore. Birds were unusually scarce from the incessant persecution they are subject to from boys and men; later on, after returning to St. Pierre, I went to Fort de France. After losing several days there, I crossed the bay of Fort Royal to Trois Islets—where I had great difficulty in getting shelter. Fortunately I found a host in the proprietor of an estate near Trois Islets; the estate was none other than 'L'habitation de la Pagerie', where the Empress Josephine was born and passed her earlier years.

"Finding lodgings in the negro barracks, and procuring sustenance at the house of my friend the proprietor, I passed some time, obtaining there nearly all the birds that I secured at all in the island.

"Trois Islets is about 20 miles south of St. Pierre, on the Caribbean

side. From there I scoured the hills and valleys to 'Ance du Diamant' on the southern point, near the famous Diamond Rock, and thoroughly canvassed that historic ground, trodden 100 years ago by the feet of the beautiful Empress of the French. In the *Jardin des Plantes*, in the suburbs of St. Pierre, I had permission to shoot, through the courtesy of the *directeur*, Monsieur Chs. Belanger. But though these gardens are extensive and beautiful, crowded with trees and shrubs of the Tropics, secluded and forbidden to the ordinary *chasseur*, I found very few species and no great numbers of any one species.

"Throughout the island there exists such a dread of the 'serpent', the Iron lance (*Trigonocephalus lanceolatus*), that I found it impossible to obtain a good boy, to assist me in finding the haunts of birds. More than once I have been startled by the cry of 'serpent' and found that my coloured brother had absconded.

"Though at first inclined to believe in the oft-repeated stories of deaths from snakebites, I soon found that the number of serpents was either grossly exaggerated, or they took good care to keep out of my way, for in all my tramps I saw but two large ones.

"There are, however, numerous deaths from these noxious reptiles during the cane season. The serpent prefers the cane fields, where he hunts the numerous rats; and, as my ground for hunting is any but the cane, for birds, this may be the reason we met so seldom. I cannot say that I was anxious to find one, however; though I did not let the possible presence interfere with my regular work.

"My thanks and those of the Institution are due to Capt. W. A. Garfield, U. S. Consul; Monsieur Chs. Belanger, *directeur du Jardin des Plantes*, and Monsieur Louis Hartmann."

Fam. TURDIDÆ.

1. *Margarops herminieri* (Lafr.).

"'Grive à pieds jaunes.'

"Rare, owing to the persecution of hunters."

2. *Margarops densirostris* (Vieill.).

"'Gros Grive.'

"Not common, being the chief bird sought by the hunters in the hunting season, consequently shy."

3. *Margarops montanus* (Vieill.).

"'Grivette.' Iris yellow.

"Length, ♂, 10 in.; alar extent, 14; wing, 4½.

"Like the same species of Dominica, it prefers the higher hills and mountains, the deep woods and their borders, and detached wood with deep shade. As numerous apparently as in Dominica."

4. *Cinclocerthia gutturalis* (Lafr.).

"'Trembleur.' Resident.

"Length, ♂, 9½ in.; alar extent, 13; wing, 4¼.

"This Trembleur, known also as the 'Grive trembleuse', is not found so easily and frequently as in Dominica. This I attribute wholly to the fact that it is pursued here with greater vigor than in the other island. So dense is the population of Martinique, that nearly every bird is considered as fit for food, and anything above a sparrow is classed as game. Even the sparrows, the 'pères noires', are caught with snares and shot with blowguns, by the little negroes of the country. In fact, they would always await my return from an excursion to obtain the mutilated birds that I would discard as useless.

"It is not strange that 'Le Trembleur', with all his queer ways and familiar habits, should now commence to disappear; not many years hence he will not be found in Martinique."

5. *Ramphocinclus brachyurus* (Vieill.).

"'Gorge blanc.' Iris hazel, in some red.

"Length, ♂, $8\frac{3}{4}$ in.; alar extent, 12; wing, 4.

"Length, ♀, $8\frac{1}{4}$ in.; alar extent, 12; wing, 4.

"Obtained several specimens at Trois Islets in August. I saw one also in the Jardin des Plantes, at St. Pierre. Mr. Semper found it in St. Lucia. Not found in the other islands. The first I have seen I shot in this island. It seems confined to Martinique and St. Lucia. Loves deep woods and the borders of streams; is easily attracted by an imitation of its note. That is the reason I am able to record the capture of so many specimens."

Fam. SYLVIIDÆ.

6. *Myiadestes genibarbis*, Sw.

"'Siffleur Montagne.'

"Length, ♂, $7\frac{1}{2}$ in.; alar extent, $10\frac{1}{2}$; wing, $3\frac{1}{2}$.

"Length, ♀, $7\frac{1}{2}$ in.; alar extent, 11; wing, $3\frac{3}{4}$.

"The fittest place in which I could have discovered my old favorite of Dominica, was in a charming ravine through which flowed a limpid stream, at 'Champ Flore'. He was clinging to a liane on which grew numerous wild pines, and whistling exactly the same as his Dominica congener.

"From the appearance of the female and from my observations in Dominica I think they breed late."

Fam. TROGLODYTIDÆ.

7. *Thryothorus martinicensis*, Sel.

"Wren. 'Rossignol.'

"Length, ♂, $5\frac{1}{2}$ in.; alar extent, $7\frac{1}{2}$; wing, $2\frac{3}{4}$.

"An inhabitant of the woods; I have not seen it near houses or sugar mills, only in the forests of the hills, and along the borders of streams where the bushes are thick."

Mr. Ober sent but a single specimen of this species: its dimensions are

somewhat larger than given by Mr. Selater. Compared with *T. rufescens*, the bill is longer; the color above is duller, being brownish; the under surface is very much paler; in *rufescens* the bands on the tail are more numerous and better defined.

Fam. SYLVICOLIDÆ.

8. *Dendroeca rufigula*, Baird.

"Yellow Bird. 'L'Oiseau Jaune.'

"Length, ♂, 5 in.; alar extent, $7\frac{1}{4}$; wing, $2\frac{1}{4}$.

"Is generally distributed throughout the island. In the old fields once cultivated for cane, and now suffered to return to pasturage, where generally the *guavas* are abundant, this bird will be found, searching about the stems and leaves of the shrub for insects. These same guava bushes are also the chosen hiding places of the venomous spiders—the Tarantula, and many a hairy monster came to grief, while myself and little black assistants were beating the bushes for birds. It is a most thorough exterminator of the small insects of the island."

This species is surely the one referred to *Sylvia ruficapilla*, Lath. (*Motacilla ruficapilla*, Gm.), by Vieillot (Nouv. Dict. xi, 1817, 228), supposing it to be the same. They differ very materially, the entire head and throat being rufous in the Martinique bird, and so described by Vieillot; whereas in *D. ruficapilla*, the crown only is stated to be rufous.

Martinique is the locality given, also, for *D. ruficapilla*, which probably was the cause of Vieillot being misled.

As the name of *ruficapilla* belongs to another species, Prof. Baird (Rev. of Amer. Birds, p. 204) applied to Vieillot's species that of *rufigula*. He then speaks of a specimen in the Museum of the Philadelphia Academy of Sciences, labelled "*S. ruficapilla*," without indication of locality. He says: "It agrees very well, especially in the greater extension of the rufous of the throat, with the *Sylvia ruficapilla* of Vieillot from Martinique; and it may be really a West Indian species."

Since then, in "North American Birds," p. 217, under *D. rufigula*, there being under examination a bird from Panama, which it was thought might be the species described by Vieillot, he has in a footnote the following remark: "Should Vieillot's species be really from Martinique, in all probability the present bird will be found to be different, and therefore not entitled to the name here given."

It now being established that Martinique is the true patria of this form, Prof. Baird's name of *D. rufigula* must be used for it: The male agrees with the description given by him of Vieillot's species, viz, in having "the rufous of entire head extending down the neck to jugulum." The measurements of the wing and tail are just the same as given by Prof. Baird, *i. e.*, wing, 2.25; tail, 2.

There is but one specimen of the female in Mr. Ober's collection, in

very poor condition; it has the upper plumage olivaceous, and on the crown is of a rather deeper shade.

9. *Setophaga ruticilla* (Linn.).

“‘*Le Gobe-mouche aurore*.’

“Not often seen.”

Fam. VIREONIDÆ.

10. *Vireosylvia calidris* var. *dominicana*, Lawr.

“‘*Quec*.’

Fam. HIRUNDINIDÆ.

11. *Progne dominicensis* (Gm.).

“Flying above the sea near the cliffs between St. Pierre and Fort de France.”

Fam. CÆREBIDÆ.

12. *Certhiola martinicana*, Reich.

“‘*Sucrier*.’

“Length, ♂, $4\frac{7}{8}$ in.; alar extent, $7\frac{3}{4}$; wing, $2\frac{1}{2}$.

“Not so abundant as in Dominica, but in greater numbers than in St. Vincent and Grenada. The Jardin des Plantes, near the city of St. Pierre, is the only place in which I have seen it plentiful. In the trees overhanging the suburbs of the city it is not an infrequent visitor, especially to the tamarind tree.

“As it lives for a while contentedly in a cage, many are caught by the negro and colored boys, with bird lime, and by the use of the blowgun. Hence their scarcity; I have walked some days for several miles without seeing this or any other bird, along the shore of the west coast.”

Fam. TANAGRIDÆ.

13. *Euphonia flavifrons* (Sparm.).

“‘*Perrouche*.’

“Length, ♂, 5 in.; alar extent, 8; wing, $2\frac{1}{2}$.

“Nowhere is this bird abundant. I have already chronicled its discovery in Dominica, St. Vincent, and Grenada, but in no island is it numerous. I might set it down as rare, did I not think it possible that it may occur in greater numbers than my researches have led me to suppose, from the fact that its secluded habits and its peculiar food cause it to betake itself to the tops of the highest trees, where it might be passed a hundred times without discovery. Though undoubtedly generally associating in small flocks, I have not as yet (with one exception), found it otherwise than alone. Its stomach always contains a peculiar viscid green flat seed, the name of which I cannot at this time recall.”

14. *Saltator guadeloupensis*, Lafr.

“‘*Gros-bee*.’

“Length, ♂, $8\frac{1}{2}$ in.; alar extent, 12; wing, 4.

“Length, ♀, 8 in.; alar extent, 12; wing, $3\frac{7}{8}$.

"Prefers the skirts of woods and open fields, utters a sharp whistle, not very loud, and flits from bush to tree in low flight. Rather abundant at Trois Islets on the hillsides. More numerous than I found it in Dominica; even plentiful in the low scrub, or second growth, that covered the hillsides upon old plantations."

Fam. FRINGILLIDÆ.

15. *Loxigilla noctis* (Linn.).

"'Pere noir.' 'Moisson.'

"Length, ♂, $5\frac{1}{2}$ in.; alar extent, 9; wing, 3.

"Length, ♀, 5 in.; alar extent, $8\frac{1}{2}$; wing, $2\frac{3}{4}$.

"In the French islands and in those in which the patois is spoken, the names of this bird are the same; the male is called the '*Pere noir*', the female the '*moisson*'.

"They are as abundant here as any species and confined to the open fields and cultivated districts without regard to altitude."

16. *Phonipara bicolor* (Linn.).

"'Mangeur des herbes.' Seed-eater.

"Length, ♀, $4\frac{1}{2}$ in.; alar extent, $6\frac{1}{2}$; wing, 2.

"The most common species, I think, in the island. Feeds principally upon the seeds of grass and noxious weeds, and hence cannot be otherwise than of great benefit to the island."

Fam. ICTERIDÆ.

17. *Icterus bonana* (Linn.).

"'Carouge.'

"Length, ♂, 8 in.; alar extent, $10\frac{1}{2}$; wing, $3\frac{1}{2}$.

"Length, ♀, $7\frac{1}{2}$ in.; alar extent, 10; wing, $3\frac{1}{2}$.

"I saw my first specimen of this bird at Morne Ronce, another half-way up the volcano of Montagne Pelée; but did not obtain one until my visit to Trois Islets, south of Fort de France. It is not in abundance that one sees it; separately and in pairs. I found it chiefly in clearings on the hills and elevated plains. It prefers the vicinity of gardens and hedges, and shuns thick woods; though I have found it in dense scrub. Upon the hills near Trois Islets I secured it in such a situation. I was reclining beneath the shade of a low tree, one very hot day in August, looking out over the beautiful bay of Port Royal, when I was suddenly brought to my feet by the shock of an earthquake, which, repeated twice, startled the birds as well as myself. Then I noted for the first time this bird in the scrub beneath the trees."

18. *Quiscalus inflexirostris*, Sw.

"'Le Merle.' Iris, ♂, hazel; ♀, pale yellow.

"Length, ♂, $10\frac{1}{4}$ in.; alar extent, 15; wing, 5.

"Length, ♀, 9 in.; alar extent, $13\frac{3}{4}$; wing, $4\frac{1}{2}$.

"This is the first island in which I saw this bird, unless the black-bird of Grenada and the Grenadines be the same. It is abundant in the Jardin des Plantes and very numerous at Morne Rouge. Its notes are entirely different from the 'Bequia sweet' of the Grenadines; but that may be owing to the difference in season. The savannas of this high region contain many in parties of from 3 to 5.

"At Trois Islets they were in abundance and there I got many, showing the different changes in plumage from young to adult. There they built their nests in a tall silk-cotton tree. They love the fronds of the palm as a retreat, doubtless feeding upon the berries that hang beneath the overarching boat-shaped spathes in large bunches. Their cry is not like those of the Grenadines, nor like that of the north, the *Q. versicolor*—but has notes in it reminding me of both. Gregarious."

I have followed Mr. Selater in referring this bird to Mr. Swainson's species; he says (P. Z. S. for 1874, p. 175): "In order to avoid giving it a fresh name I call it *Q. inflexirostris*, Sw., though the bill certainly does not quite agree with Swainson's figure (An. in Menag. p. 300)." The specimens before me differ from Swainson's figure of the bill spoken of above in being apparently shorter and stouter. Swainson says, l. c.: "Size and colour precisely like *Q. lugubris*; but the great difference in their bills induces me to consider them quite distinct. In this the bill is longer and much more slender," &c.

A comparison with *Q. lugubris* shows the present bird to closely resemble it in coloration: it is, however, somewhat larger, the bill longer and more curved, but proportionately not more slender.

Mr. Cassin in his Study of the *Icteridæ* (Proc. of Acad. Nat. Sci. of Phila. 1866, p. 407) refers a specimen in the Museum of the Academy to *Q. inflexirostris*, Sw.; he says: "One specimen only in the Acad. Mus. seems to be this species, but which is, unfortunately, without label stating locality. The bill is exactly the length and otherwise very nearly as given by Mr. Swainson as cited above, though somewhat thicker. It is the only specimen that I have ever seen in which the commissure is an uninterrupted curve or arc of a circle,—not straight nor sinuated as in all other species known to me (except *Q. niger* of St. Domingo) and described in this memoir."

The dimensions given by Mr. Cassin are about the same as those of specimens from Martinique, but the bills differ; he gives, "chord of upper mandible about one and four fifth inches." In the present bird it measures but one and a quarter inches.

A specimen of *Q. niger* from St. Domingo, presented by Prof. Gabb, is of about the same size, and differs in coloration only in having the breast and abdomen without lustre—the bills though are very different, that of *Q. niger* is wider at the base, longer, straighter, and narrower at the end; the commissure is nearly straight, and the ridge of the upper mandible is perceptibly flattened. The locality of Mr. Swainson's type is unknown, and possibly it may not be the Antillian species referred to

it; but for the present, it is doubtless best to let it remain as Mr. Swainson's species.

On looking at my *Q. luminosus* from Grenada, I find it has a longer and more curved bill than the Martinique bird; the chord of the upper mandible measures one and a half inches. But with its highly lustrous and more violaceous plumage, together with the decided bright green color of the wings, it does not agree with the description given of *Q. inflexirostris*.

In the account of *Q. luminosus* I stated that it was the only West Indian species of *Quiscalus* I knew of in which both sexes were not black; but the female of the present bird is brown also. Of that sex, Mr. Ober sent but one adult example; the upper plumage is of a smoky-brown, the feathers of the crown edged with fulvous; the tail-feathers have their inner webs black, the outer webs are brown; sides of the head and the throat light ashy-gray; the breast and upper part of the abdomen are brownish-ash; lower part of abdomen, flanks, and under tail coverts dark smoky-brown; thighs dull fulvous-brown; bill and feet black.

Fam. TYRANNIDÆ.

19. *Elainea martinica* (Linn.).

"Flycatcher. 'Gobe mouche.'

"Length, ♂, 7 in.; alar extent, $9\frac{1}{2}$; wing, $3\frac{1}{4}$.

"Length, ♀, $6\frac{1}{2}$ in.; alar extent, 10; wing, $3\frac{1}{4}$.

"Very few of this species to be seen; frequents the high hills, especially the wooded hollows and ravines."

20. *Myiarchus sclateri*, Lawr.

"Flycatcher."

The upper plumage is deep dark olive, the head above blackish-brown. Unfortunately, the only feathers left in the tail are the outer four on one side; the outermost two are dark brown and without rufous edgings on the inner webs; the other two feathers are brownish-black, with their inner webs edged with light rufous for about one-quarter their width; quills dark brown, their inner webs bordered with pale salmon-color; wing-coverts edged with dull white; under wing-coverts light ash, with just a tinge of yellow; throat and breast of a clear cinereous gray; abdomen and under tail-coverts dull pale yellow; sides cinereous; bill and feet black.

Length (fresh), $7\frac{1}{2}$ in.; wing, $3\frac{3}{4}$; tail, $3\frac{1}{2}$; tarsus, 1; middle toe and claw, $\frac{15}{16}$; hind toe to end of claw, $\frac{8}{16}$.

The single specimen sent is of about the size of *M. erythrocerus*, Sel., but the plumage of the new species above is dark, with no approach to the earthy-brown color of the other; below they do not differ so much, but in *M. sclateri* the yellow is duller and more restricted; they differ materially in the rufous markings on the inner webs of the tail-feathers; in *M. erythrocerus* this color occupies about one-half the web on the

outermost two feathers, and on the others two-thirds or more; the new species differs conspicuously in its much longer and stronger tarsi and toes.

Named in compliment to Mr. P. L. Selater.

21. *Tyrannus rostratus*, Sel.

“‘Piperee.’ Resident.

“Length, ♂, $9\frac{1}{2}$ in.; alar extent, $14\frac{3}{4}$; wing, $4\frac{3}{4}$.

“Length, ♀, 10 in.; alar extent, $15\frac{1}{4}$; wing, $4\frac{3}{4}$.

“These two specimens are the only ones I have seen. Though uncommon in Dominica, it may be considered rare here. Its local name, ‘Piperee,’ is in use throughout the islands, and is derived from its cry.”

Fam. TROCHILIDÆ.

22. *Eulampis jugularis* (Linn.).

“‘Colibri gorge rouge.’

“Length, ♂, $5\frac{1}{8}$ in.; alar extent, $7\frac{1}{2}$; wing, 3.

“Length, ♀, $5\frac{1}{4}$ in.; alar extent, 7; wing, 3.

“The most abundant of the humming-birds in the mountain districts, but of rare occurrence in the lower portions of the island. Not so abundant, however, as in Dominica.”

23. *Eulampis holosericeus* (Linn.).

“Length, ♂, $4\frac{3}{4}$ in.; alar extent, 6; wing, $2\frac{1}{4}$.

“Length, ♀, $4\frac{3}{4}$ in.; alar extent, $6\frac{1}{4}$; wing, $2\frac{1}{4}$.

“This species is found in the mountains as well as in the valleys of the lowlands. It is found in the Jardin des Plantes, and on the elevated plateau of Morne Ronge and Champs Flores. In the elevated districts it is not in the numbers of *E. jugularis*.”

24. *Orthorhynchus exilis* (Gm.).

“‘Fou fou.’

“Length, ♂, $3\frac{1}{2}$ in.; alar extent, $4\frac{3}{4}$; wing, 2.

“Length, ♀, $3\frac{1}{2}$ in.; alar extent, $4\frac{3}{4}$; wing, $1\frac{7}{8}$.

“This little gem is found all over the island, though not in such profusion as I found it in Dominica. In the Jardin des Plantes it is the most numerous species, perhaps. At Morne Ronge and at Trois Islets, I found it occasionally.

“As in the other islands where the French and French *patois* is spoken, this little bird is known to the common people as ‘fou fou’, or crazy crazy, from its eccentric motions while in flight.

“They have also a superstition that if you eat its body it will make you crazy, and in their ignorance they believe it is used by the physicians in some mysterious medicine—hence its vulgar name in the English slands of ‘Doctor Bird’.”

Fam. CYPSELIDÆ.

25. "*Chætura*. Seen.

"Apparently the same as my Dominica specimens."

Fam. ALCEDINIDÆ.

26. *Ceryle alcyon* (Linn.).

"Seen; rare and shy."

Fam. CUCULIDÆ.

27. *Coccyzus minor* (Gm.).

"('Concou manioc.'"

"Length, ♂, 14 in.; alar extent, 17; wing, 6.

"Length, ♀, 13½ in.; alar extent, 16½; wing, 6.

"I found this species abundant, if one can say that any species is abundant in an island so barren of birds as this. At least I could find one almost any day, by beating the scraggy bushes upon the hillsides of Trois Islets. The same in habits and notes as the 'Concou' of the other islands."

Fam. FALCONIDÆ.

28. *Tinnunculus sparverius* var. *antillarum* (Gm.).

"Seen; uncommon."

Fam. FREGATIDÆ.

29. *Fregata aquila* (Linn.).

"Seen."

Fam. PHÆTHONIDÆ.

30. *Phæthon flavirostris* Brandt.

"It undoubtedly has its haunt in the cliffs near St. Pierre, south, as I have seen it near there and the cliff wall is honeycombed with holes, just such as the Tropic bird chooses for itself."

Fam. PELECANIDÆ.

31. *Pelecanus fuscus* (Linn.).

"Seen."

Fam. ARDEIDÆ.

32. *Ardea herodias* (Linn.).

"Seen flying high above Champs Flores from the mountain forest to the ocean."

33. *Florida cærulea* (Linn.).

"Seen; in blue and white plumage."

34. *Butorides virescens* (Linn.).

"The most common, though not plentiful."

Fam. COLUMBIDÆ.

35. *Columba corensis* (Gm.).

“‘Ramier.’ Iris yellow.

“Though persistently hunted, this bird still inhabits the mountains, making its home especially upon the volcano of Mountain Pelée. In all the highest hills and mountains it may be found in sparse numbers. Several attempts that I made to secure this species, on the sides of the volcano, were fruitless owing to its wildness.”

36. *Zenaida martinicana*, Bp.

“‘Tourterelle.’

“Rarely seen, but inhabits the dry slopes near the sea.”

37. *Chamæpelias passerina* (Linn.).

“‘Ortolan.’ Resident.

“As the extent of cultivated and pasture land is greater than in Dominica, so is this bird found in greater numbers, though not abundant in either island.”

38. *Geotrygon montana* (Linn.).

“‘Perdix.’ Iris gold; resident.

“Length, ♂, $11\frac{1}{4}$ in.; alar extent, 19; wing, $6\frac{1}{2}$.

“Though this species is far from abundant, the natives occasionally bring the birds in for sale. The ‘Ramier’ is, perhaps, more plentiful, but from its more secluded habits and from its keeping itself in the air and on the tallest trees, never touching the ground, is less subject to persecution than the ‘Perdix’. As in the United States, the snare and trap kill two to one killed by the gun; and the *springs* of the natives will soon exterminate this bird from the island and add it to the already growing list of animals that *were* and now are not.”

Fam. SCOLOPACIDÆ.

39. *Tringoides macularius* (Linn.).

“‘Becasse.’

“Length, ♂, $7\frac{1}{2}$ in.; alar extent, $13\frac{1}{4}$; wing, $4\frac{1}{2}$.

“A resident, but merely a straggling one, left from the flocks that visit here in the winter months.”

Fam. LARIDÆ.

40. *Sterna dougalli*, Mont.

“‘Hirondelle de Mer.’

“The sea birds are mostly found on the Atlantic side of the island, which I did not visit. This species is common, now (August), about the shores of Port Royal Bay.”

NEW YORK, December 31, 1878.

NOTE ON *PLATESSA FERRUGINEA*, D. H. STORER, AND *PLATESSA ROSTRATA*, H. R. STORER.

By G. BROWN GOODE and TARLETON H. BEAN.

In a paper on the Fishes of Nova Scotia and Labrador, published in 1857,* Mr. H. R. Storer described a species of flounder under the name *Platessa rostrata*. This species has been a puzzle to ichthyologists. Dr. Günther, in 1862, ventured the remark, that it "appears to be allied to *Pleuronectes limanda*."† Professor Gill, in 1861, referred it to his nominal genus *Myxopsetta*, and in 1864 to *Limanda*.‡ While investigating the fauna of the Nova Scotia coast in 1877, the naturalists of the United States Fish Commission made especial efforts to find this species, but without success, which was a matter of some surprise, since nearly all the species recorded from the Gulf of St. Lawrence were observed in the course of the summer.§ In 1878, several specimens were trawled in Massachusetts Bay, which were strongly suggestive of Storer's *Platessa rostrata*, and which, upon comparison with his description, were found to agree with it in every particular except that in relation to the relative size of the scales on the superior portion of the operculum and the neighborhood of the lateral line, a matter apparently of individual variation. A more extended study of the subject has convinced us that the individuals at first studied, as well as the ones described by H. R. Storer, should be identified with *Platessa ferruginea*, D. H. Storer, a species which should undoubtedly be referred to the genus *Limanda* of Gottsche. *Limanda* was established by Gottsche in 1835 in Wiegmann's Archiv für Naturgeschichte (p. 160), and is synonymous with *Myxopsetta*, described by Professor Gill in 1864,|| distinguished by him from *Limanda* by the following characters: "snout retuse" (instead of "conic"); "mouth very oblique" (instead of "moderately oblique").

* Observations on the Fishes of Nova Scotia and Labrador, with Descriptions of New Species. By Horatio R. Storer. p. 268, pl. viii, fig. 2. < *Boston Journ. of Nat. Hist.*, vi, 1857, pp. 247-270, pl. vii, viii.

† Catalogue of the Fishes in the British Museum, iv, 1862, p. 447.

‡ Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

§ Regarding the habitat of *Platessa rostrata*, Storer wrote as follows: "With the exception of one specimen at Red Bay, this species was met with only at Bras d'Or, where it is very abundant, inhabiting however a far different region from the (*Platessa*) *plana* just mentioned. Instead of sheltered bays and harbors, it delights in the surf of the ocean beaches exposed to the waves of the whole Gulf, and is here taken in great numbers at the drawing of the herring seines."—*Op. cit.* p. 269.

|| Proc. Acad. Nat. Sci. Phila. 1864, p. 216 (in synopsis).

The following enumeration of the radial formulæ of eleven specimens of *Limanda ferruginea* should be placed on record:

Cat. No.	Locality.	Dorsal rays.	Anal rays.	Pectoral rays.		Ventral rays.	Caudal rays.
				Right.	Left.		
21020	Halifax, N. S.	85	65	12	.....	6	18
"	.....do.....	81	59	11	10	6	18
"	.....do.....	79	57	11	10	6	18
"	.....do.....	85	63	11	10	6	18
21902	Gloucester, Mass.	83	63	10	14	6	18
21903	.....do.....	87	66	12	11	6	.....
"	.....do.....	80	60	13	12	6	.....
"	.....do.....	82	61	11	11	6	.....
"	.....do.....	83	61	11	11	6	.....
"	.....do.....	73	58	11	10	6	.....
"	.....do.....	76	59	11	10	6	.....

Certain individuals exhibit black spots instead of the ordinary markings of yellowish red; this may be sexual, but is more probably due to the color of the bottom on which they live. Adult individuals almost invariably exhibit markings of a lemon-yellow hue on the white under side of the body, contiguous to the tail.

The synonymy of the species stands as follows:

***Limanda ferruginea*, (Storer) Goode & Bean.**

Platessa ferruginea, STORER, Report on the Ichthyology and Herpetology of Massachusetts, 1839, p. 41, pl. 2.—DEKAY, Zoology of New York, Fishes, 1842, p. 297, pl. xlviii, fig. 155.

Pleuronectes ferrugineus, GÜNTHER, Catalogue of the Fishes in the British Museum, iv, 1862, p. 447.

Myzopsetta ferruginea, GILL, Catalogue Fishes of Eastern Coast N. A. 1861, p. 51; Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

Platessa rostrata, H. R. STORER, Boston Journ. Nat. Hist. vi, 1850, p. 268, pl. viii, fig. 2.—GÜNTHER, op. cit. p. 447 (considers it to be allied to *Pleuronectes limanda*).

Myzopsetta rostrata, GILL, Catalogue Fishes of Eastern Coast N. A. 1861, p. 51.

Limanda rostrata, GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

Limanda ferruginea is closely related to *Limanda vulgaris*, Gottsche, from which it is distinguished by its shorter pectorals, smaller scales, lower dorsal and anal fins, and the greater average number of rays in those fins. It is certainly a strongly marked geographical subspecies, and must for the present be regarded as a distinct species.

DECEMBER, 1878.

ON THE IDENTITY OF *BROSMIUS AMERICANUS*, GILL, WITH *BROSMIUS BROSME*, (MÜLLER) WHITE.

By G. BROWN GOODE and TARLETON H. BEAN.

Dr. D. H. Storer, in his Report on the Ichthyology and Herpetology of Massachusetts, published in 1839, catalogued the common cusk of the New England coast under the name *Brosmius vulgaris*, considering

it to be identical with the European species of the same genus. In this he was followed by Dr. DeKay, in his *Fishes of New York*, published in 1842. In 1845, in his *Synopsis of the Fishes of North America*, Dr. Storer adopted for the American cusk the name *Brosmius flavescens*, which had been given in 1819 by Le Sueur to a supposed new species from Marblehead, Mass., characterized in his figures and descriptions by a prolonged lower jaw and a double barbel.*

We believe that the specimen described by Le Sueur was a deformed individual of the common species, but this is a mere matter of opinion, and in any event the name cannot be used. In 1863, Professor Gill substituted the specific name *americanus* for the name *flavescens* adopted by Storer.

After a careful examination and comparison of two specimens from Europe (No. 17,366, Norway, Bergen Museum) with specimens from Massachusetts Bay, we are compelled to believe that the common cusk of New England is identical with that of Europe. In the proportions of their bodies they agree exactly, and the Norwegian specimens agree in every respect with Storer's description of *Brosmius flavescens* in his *History of the Fishes of Massachusetts*. The radial formulæ of three specimens are given below:

No. 17366 A.	Bergen.	D. 91.	A. 75.
No. 21813.	Gloucester.	D. 97.	A. 75.
No. 17366 B.	Bergen.	D. 99.	A. 73.

DECEMBER, 1878.

ON THE MORTALITY OF FISHES IN THE GULF OF MEXICO IN 1878.

By Lieut. J. P. JEFFERSON, U. S. A.

KEY WEST, FLORIDA.

Prof. SPENCER F. BAIRD,

Smithsonian Institution, Washington, D. C.:

PROFESSOR: I have the honor to acknowledge the receipt of your valued favor of October 30th, which reached me after a delay, I being absent from Fort Jefferson. This absence, coupled with my wish to get all possible facts in regard to the destruction of fish in these and neighboring waters, will account for my apparent tardiness.

Since my communication in October another large body of the dark-colored water described therein made its way down the coast, across Florida Bay, striking Tortugas about the 20th of November, and extending up the reef as far as Key West, probably further. At Key West its approach could be seen distinctly; at first, belts of it, some narrow, others broad, came into the harbor, following the various channels leading to the northward, and only in these belts were the fish affected; in the course of twenty-four hours, however, all the water in the harbor was similarly colored, and the surface was covered with dead and dying fish.

* Mémoires du Muséum, v, 1819, p. 158, pl. xvi.

They seemed to be affected very much as I have seen them when "fish berries" were thrown into a pond—coming to the surface, swimming around in circles, sometimes on the side or back, the movements growing weaker rapidly and ceasing altogether in 20 or 30 minutes. I noticed one fact which may or may not be of importance: I took a small fish, known here as a cow-fish, from the water when just about dead, and, having examined it for a minute or two, cast it back, when, to my surprise, it swam off briskly, going down at once.

As in the previous instance, the shores at Fort Jefferson and neighboring keys were covered with fish, and here, at Key West, the north side of the island was in similar condition. From correspondence and conversation I have gathered, in addition to the above, the following facts, some, and possibly all, of which may be of interest.

A fishing-smack sailed some 70 or 80 miles to the westward from Fort Jefferson without getting clear of the water. Another smack found the surface of the water out some 15 miles in the Gulf Stream covered with dead fish—large sharks, turtles, king-fish, &c., but no porpoises, and, as far as I have heard, no dead porpoises have been seen. An officer coming over from New Orleans by steamer was more than 12 hours passing through a field of dead fish. Oysters in Tampa Bay were killed by the water. In October the Caloosahatchee River overflowed its banks along its entire length except at a bluff at Fort Meyers, and the whole country in that section was under water, reported to be the result of the overflow of Lake Okeechobee. A gentleman who knows that part of the State well tells me that the swampy land bordering on Okeechobee is grown up largely with dogwood; the water in the lake gradually rising and spreading over the surrounding marshes or swamps probably kept these dogwood trees wholly or partly submerged for weeks, until the divide between Okeechobee and the headwaters of Caloosahatchee River gave way. In the possible poisonous effect of water impregnated with dogwood, &c., a theory of the cause of the loss of fish-life may be found. I understand from Dr. Joseph Y. Porter, U. S. A., that he forwarded to your address a bottle of water. I am in hopes that an analysis of it will enable you to settle the question; if so, I would be indebted greatly to you if you would inform me.

In regard to my former letter, you can make any use of it you desire, as well also as this. I am happy to know that you consider the subject of some importance. I feared that I might be imposing upon your valuable time.

If there are any of the small fish of this vicinity which you desire I will be glad to do what I can towards obtaining them, either preserved in spirits or the skins. Please give me common names, if possible; for I have no books and no technical knowledge.

I am, sir, very respectfully, your obedient servant,

J. P. JEFFERSON,
Lieutenant Fifth Regiment Artillery.

NOTES ON THE FISHES OF BEAUFORT HARBOR, NORTH CAROLINA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

In the Proceedings of the Philadelphia Academy of Natural Sciences for 1877, pp. 203-218, is a paper entitled "Notes on the Natural History of Fort Macon, N. C., and Vicinity (No. 3)," by Dr. H. C. Yarrow, which treats of the species of fishes obtained by Drs. Cones and Yarrow in Beaufort Harbor and neighboring waters during the period of their residence at Fort Macon.

During the past summer (1878), the writers, accompanied by Prof. A. W. Brayton and a party of students from Butler University, spent three weeks in the month of August at Beaufort, the chief business of the party being the collection of fishes. We obtained, in all, about seventy-five species, many of which are not included in Dr. Yarrow's list.

For the purpose of making as complete a showing of the Ichthyology of the North Carolina coast as possible, we here include not only the species which we have ourselves observed, but also those taken by Drs. Cones and Yarrow. Brief notes on the local habits or distribution of each species are given, as well as occasional critical remarks on the nomenclature. The sequence and nomenclature are essentially as in Professor Gill's Catalogue of the Fishes of the East Coast of North America, 1873. The vernacular names here given are only those used by the Beaufort fishermen.

Family LOPHIIDÆ.

Genus LOPHIUS Linn.

1. *Lophius piscatorius* L.—All-mouth.

(*Lophius americanus* Gill, l. c.)

Not seen alive; two sets of jaw-bones picked up on the beach below Cape Lookout. Said to be occasionally taken by the fishermen. Until some evidence other than the difference of habitat is offered to show that the American "Angler," *Lophius americanus* DeKay, is distinct from the European *Lophius piscatorius* L., it seems to us that the burden of proof is on the side of the doubtful species. It seems better to consider the two forms on opposite sides of the Atlantic as identical until proved to be distinct, rather than distinct until proved to be identical. In the case of this and numerous other northern fishes of wide range, Dr. Gill (l. c.), on the contrary, has "preferred to retain the names given to the American forms as distinct species, although he is inclined to believe that they will eventually be found to be co-specific with other forms."

DIODONTIDÆ.

Genus CHILOMYCTERUS Bibron.

2. *Chilomycterus geometricus* (L.) Kaup.—*Swell-toad*.

Very abundant; taken in every seine; sold by small boys as curiosities, at from one to five cents each.

TETRODONTIDÆ.

Genus LAGOCEPHALUS Swainson (Gill).

(*Tetrodon* Gill, l. c. The genus *Tetrodon*, as first restricted by Swainson, is essentially equivalent to *Arothron* Müller, which differs from *Lagocephalus* in its closed nasal tentacles. The name *Lagocephalus* is therefore accepted by Professor Gill for the present genus.)

3. *Lagocephalus lævigatus* (L.) Gill.

Found by Dr. Yarrow "in small streams running through salt marshes. But few seen."

Genus CIRRISOMUS Swainson.

(*Chilichthys* Müller, Gill, l. c. The genus *Cirrissomus* of Swainson (1839) is based on *Chilichthys spengleri* (*Tetrodon spengleri* Bloch), and therefore antedates and must supersede *Chilichthys* Müller (1841).)

The name is given in allusion to the short, fleshy appendages or barbels along the sides in the typical species. These are not found in the other species of the genus, but the name cannot be set aside on that account. *Chilichthys* may perhaps be retained as a subgeneric name for those species without fleshy slips.

Cirrissomus differs from *Lagocephalus* chiefly in the form of the fins. In the latter genus, the dorsal and anal are falcate, of 11 to 14 rays each, and the caudal fin is forked. In *Cirrissomus*, these fins are all more or less rounded, and the dorsal and anal contain but 6 to 8 rays each. In *Lagocephalus*, the body is elongate, the caudal peduncle especially so, the skin comparatively smooth, except on the inflated part of the abdomen. There is a fold of skin along each side of the tail below (usually well marked, but nearly obsolete in *L. lævigatus*). The coloration is peculiar, the skin having a metallic lustre. In *Cirrissomus*, the body is comparatively short and broad, with short caudal peduncle. There is usually no fold along the lower side of the tail. The coloration is usually variegated, and without metallic lustre, and the prickles are variously arranged. Four species of *Cirrissomus* are found on our Atlantic coast: *C. turgidus* (L.), *C. testudineus* L., *C. trichocephalus* (Cope), and *C. spengleri* (Bloch). The first is common; the others are rare, or occasional visitants.

4. *Cirrissomus turgidus* (L.) Jor. & Gilb.—*Swell-toad*; *Puffer*.

Very common everywhere about Beaufort; taken in the nets with *Chilomycterus geometricus*.

OSTRACIIDÆ.

Genus LACTOPHRYS Swainson.

5. *Lactophrys trigonus* (L.) Poey.

A specimen in the State Museum at Raleigh, from Beaufort. Two specimens were found on the beach at Fort Macon by Dr. Yarrow. Numerous specimens of another species (*Lactophrys quadricornis* (L.)), from the coast of South Carolina, are in the U. S. National Museum. This is a common West Indian species, not before recorded from our coast.

BALISTIDÆ.

Genus ALUTERA Cuvier.

6. *Alutera cuspicauda* DeKay.—*Fool-fish*.

Rather common in Beaufort Harbor. Numerous specimens obtained.

7. *Alutera aurantiaca* (Mitchill) Jor. & Gilb.—*Fool-fish*.

(*Ceratacanthus aurantiacus* Gill, l. c.)

Rather common; with the preceding. We find no warrant for the genus *Ceratacanthus* Gill, based on this species. It is certainly very closely related to the preceding.

Genus STEPHANOLEPIS Gill.

The genus *Stephanolepis* of Gill is essentially equivalent to *Monacanthus* as properly restricted by Bleeker and others. In this large genus there are two types, which may be called genera, each represented on our coast by one species. One of these, which contains the most of the species, and for which the name of *Stephanolepis* may be retained, has the abdominal flap small, and not exceeding the ventral spine. *Monacanthus* proper has the abdominal flap greatly developed, much exceeding the spine. *Monacanthus setifer* Bennett, of the former group, is very common on our coast. *Monacanthus occidentalis* Günther, of the latter group, is probably a straggler from the West Indies. *Canthorhinus* Swainson, occasionally used for this latter group, is apparently synonymous with *Liomonacanthus* Bleeker, over which name it has priority. *Canthorhinus*, thus defined, differs from *Monacanthus* in having the ventral spine immovable, and the dorsal spine without barbs.

8. *Stephanolepis setifer* (Bennett) Gill.—*Common Fool-fish*.

One of the commonest fishes in Beaufort Harbor, swarming everywhere about the wharves.

HIPPOCAMPIDÆ

Genus HIPPOCAMPUS Cuvier.

9. *Hippocampus antiquorum* Leach.

Not common. Preserved by fishermen as a curiosity, and sold to visitors at about twenty-five cents each.

SYNGNATHIDÆ.

Genus SIPHONOSTOMA Rafinesque (Gill).

10. *Siphonostoma fuscum* (Storer) Jor. & Gilb.*(Syngnathus fuscus et peckianus Storer.)*

Very common among weeds along the Beaufort shore. The specimens taken were all small. Drs. Coues and Yarrow found this species and others of which we obtained many specimens, "rare," and *vice versa*. The chief reason of this discrepancy is found in the fact that our headquarters were in the village of Beaufort on the mainland, and our chief collections of small fishes were made among the wharves. Their headquarters were at Fort Macon, on one of the long sand islands or sandspits which make such a characteristic feature of the North Carolina coast. On this outer island, "Fool-fish," "Pipe-fish," Blennies, and the like, are not found.

FISTULARIIDÆ.

Genus FISTULARIA Linn.

11. *Fistularia tabaccaria* L.

Two specimens observed by Dr. Yarrow.

SOLEIDÆ.

Genus APHORISTIA Kaup.

12. *Aphoristia plagiosa* (L.) Jor. & Gilb.

Abundant. Many young specimens taken on the sand-shoals. This species belongs to *Aphoristia*, and not to *Plagusia*, as the latter genus is restricted by Kaup and Günther. The proper orthography of the specific name is apparently *plagia*, not *plagiosa*, unless the latter was originally a misprint for *plagusia*.

Genus ACHIRUS Lacépède.

13. *Achirus lineatus* (L.) Cuv.

But one specimen seen by us at Beaufort. We obtained this Sole in the Neuse River, at Goldsboro', in completely fresh water, with *Belone longirostris*, *Ioa vitrea*, *Alvordius crassus*, *Noturus cleutherus*, *Boleosoma maculaticeps*, *Luxilus chlorocephalus*, *Zygonectes atrilatus*, *Hybognathus nuchalis*, *Micropterus pallidus*, etc.

PLEURONECTIDÆ.

Genus PSEUDOPLEURONECTES Bleeker.

14. *Pseudopleuronectes americanus* (Walb.) Gilf.

Rare (Yarrow). Not seen by us.

Genus PSEUDORHOMBUS Bleeker.

(*Chenopsetta* and *Ancylosetta* Gill.)

In Professor Gill's Catalogue of the Fishes of the East Coast of North America, from Greenland to Georgia (Proc. Acad. Nat. Sci. Phila. 1861), many new genera are proposed without description or remark, most of them being defined at a later period. Two of the genera of Flounders there noted, *Chenopsetta* and *Reinhardtius* (proposed in 1861; defined in 1864), are apparently identical with *Pseudorhombus* and *Platysomatichthys* of Bleeker, proposed and defined in 1862. It is necessary, therefore, to substitute the latter ill-chosen names for the preferable names of Dr. Gill, if we hold with the present writers (and most others,—see Dall, Nomenclature of Zoölogy and Botany, 1877, pp. 17, 35) that a generic name *without a diagnosis*, placed before the names of one or more species, has no more claim on our recognition than an unpublished manuscript name. The adoption of either is a matter of courtesy or convenience, not of duty.

If the Pacific coast genus *Paralichthys* is truly sinistral, as supposed by Dr. Gill (Proc. Ac. Nat. Sci. Phila. 1864, 197), it is probably identical with *Pseudorhombus*, and as the prior name it should supersede the latter.

The genera of North American Flounders which seem to be worthy of retention may be thus compared:

* Pectoral fins well developed. (PLEURONECTIDÆ.)

† Mouth large, the broad, flat maxillary extending to below the eye; teeth nearly equal on the two sides of the jaws.

‡ Ventral fins both lateral, neither of them on the ridge of the abdomen. (*Hippoglossinæ*.)

a. Body dextral.

b. Caudal fin emarginate; teeth strong.

c. Lateral line arched in front.....HIPPOGLOSSUS.

cc. Lateral line not arched.....PLATYSOMATICHTHYS.

bb. Caudal fin entire, its middle rays produced; teeth moderate; lateral line not arched.

d. Dorsal beginning over eye; scales moderate, mostly ctenoid.

HIPPOGLOSSOIDES.

dd. Dorsal beginning in front of eye; scales very small, cycloid.

PSETTICHTHYS.

aa. Body sinistral; lateral line arched in front.

e. Caudal fin entire. (*Pseudorhombus* or).....PARALICHTHYS.

ee. Caudal fin emarginate.....UROPSETTA.

‡‡ Ventral fin of the colored side on the ridge of the abdomen; body sinistral; teeth small. (*Rhombinæ*.)

f. Lateral line nearly straight; no vomerine teeth: dorsal rays all simple.....CITHARICHTHYS.

ff. Lateral line arched in front; vomer with teeth; anterior rays of dorsal branched; scales cycloid..LOPHOPSETTA.

‡‡ Mouth small, the short, narrow maxillary scarcely reaching beyond the front of the eye; teeth mostly on the blind side. (*Pleuronectinæ*.)

g. Teeth slender, acute, in several series; body dextral; lateral line nearly straight, with a dorsal branch.

h. Lips plicate; dorsal fin anteriorly twisted over to the blind side.....PLEURONICHTHYS.

hh. Lips simple; dorsal fin anteriorly on the dorsal ridge.

HYP SOPSETTA.

gg. Teeth blunt, usually compressed, in one series, forming a cutting edge.

i. Body dextral.

j. Lateral line with a recurrent dorsal branch.

k. Lateral line nearly straight; scales cycloid, those on the cheeks similarPAROPHRYS.

kk. Lateral line arched in front; scales ctenoid; those on the cheeks stellate or tuberculate.

LEPIDOPSETTA.

jj. Lateral line simple.

l. Lateral line arched in front; scales ctenoid...LIMANDA.

ll. Lateral line nearly straight.

m. Dorsal rays less than 80.

n. Scales ctenoid, closely imbricated.

PSEUDOPLEURONECTES.

nn. Scales small, smooth or rough, scarcely imbricated.....PLEURONECTES.

mm. Dorsal rays more than 100; body elongate; scales smooth.....GLYPTOCEPHALUS.

ii. Body sinistral, covered with scattered stellated tubercles; lateral line nearly straight....PLATICHTHYS.

**** Pectoral fins wanting (in our species); mouth twisted toward the colored side.**
(SOLEIDÆ.)

o. Vertical fins free from the rounded caudal; body dextral; ventral of the colored side continuous with the anal. (*Soleina*.)

p. Scales very rough; lateral line straight; teeth villiform, on blind side only.....ACHIRUS.

oo. Vertical fins confluent around the pointed tail; body sinistral; ventrals free from the anal. (*Plagusina*.)

q. No lateral line; teeth minute, on blind side only; ventral fin of blind side only present; lips not fringed; snout not hooked; scales ctenoid.....APHORISTIA.

15. *Pseudorhombus ocellaris* (DeKay) Lyman.—Flounder.

(*Chænopsetta ocellaris* Gill, l. c.)

Very common.

16. *Pseudorhombus dentatus* (L.) Jor. & Gilb.

Tolerably abundant (Cones and Yarrow).

17. *Pseudorhombus quadrocellatus* (Gill) Jor. & Gilb.

Brownish olive, with four large ocellated spots, round or elliptical in shape; the first above the arch of the lateral line; the three posterior forming an isosceles triangle; the posterior one in the apex on the lateral line; body oval, compressed and much elevated, highest at middle of body; profile with an abrupt angle at anterior margin of orbit: lower

eye beginning in front of the upper; mouth rather small, maxillary reaching to below middle of orbit; teeth comparatively small, about 14 on each side in the lower jaw, the canines of upper jaw little developed; dorsal fin beginning in front of pupil; its anterior rays long, filiform, and with free tips; anal fin beginning well forwards, but little behind the insertion of the ventrals; ventral fin of colored side much the longer; gill-openings comparatively narrow; branchiostegal membranes broadly connected at base; gill-rakers short and strong, few in number, less than 10 below the angle of the arch; head $3\frac{3}{4}$ in length to base of caudal; depth $1\frac{3}{4}$. D. 70. A. 55. Lat. l. about 90.

Two specimens were obtained in Beaufort Harbor, from one of which the above description was taken. This is probably the species noticed by Dr. Yarrow as *Chænopsetta oblonga*. It is a rare and little known species, noticed but once before on our Atlantic coast. Professor Gill's original type came from Pensacola, Fla.

Genus LOPHOPSETTA Gill.

18. *Lophopsetta maculata* (Mitch.) Gill.—*Plaice*.

Common on the sand bars.

GADIDÆ.

Genus PHYCIS Bloch & Schneider.

19. *Phycis regius* (Walb.) Jor. & Gill.

(*Urophycis regius* Gill, l. c.)

One specimen taken by Dr. Coues. Another Gadoid was described to us as being sometimes taken.

OPHIDIIDÆ.

Genus OPHIDIUM Linn.

20. *Ophidium marginatum* DeK.

One specimen observed by Dr. Coues.

ZOARCIDÆ

Genus ZOARCES Cuvier.

21. *Zoarces anguillaris* (Peck) Storer.

Two specimens taken by Dr. Yarrow from the wharf at Fort Macon.

BLENNIIDÆ

Genus BLENNIUS Linnaeus.

22. *Blennius geminatus* Wood.

Very abundant, especially about Duncan's wharf in Beaufort. Most of our specimens were taken from clusters of Ascidians. The specimen

referred to by Dr. Yarrow as *Blennius fucorum* is probably of this species.

Genus *HYPLEUROCHILUS* Gill.

23. *Hypleurochilus punctatus* (Wood) Gill.

Abundant with the preceding and the next along the Beaufort shore.

Genus *CHASMODES* Valenciennes.

24. *Chasmodes bosquianus* (Lac.) C. & V.

Tolerably abundant along the Beaufort shore. Specimens of both the nominal species *C. bosquianus* and *C. novemlineatus* were taken. They differ only in coloration, and we have no doubt that the latter is the male and the former the female of the same species. We have received specimens of both forms, taken in Chesapeake Bay, from Prof. P. R. Uhler. This is the species called *Chasmodes quadrifasciatus* by Uhler and Luger. The true *quadrifasciatus*, which may not be American, has never been recognized. The coloration in the male (?), or "*C. novemlineatus*," is in life as follows: Olive-green, with about nine horizontal narrow blue lines, these somewhat irregular and interrupted, and converging towards the lateral line; opercular membrane and a broad stripe through the middle of the spinous dorsal deep orange-yellow; anal fin dark, the fins with white membranaceous tips; head with fine black dots.

The female (?), or *C. bosquianus*, is dark olive-green, reticulated with narrow pale green lines and with several broad dark vertical bars, which are more distinct posteriorly; vertical fins similarly marked.

BATRACHIDÆ.

Genus *BATRACHUS* Linnæus.

25. *Batrachus tau* L.—*Toad-fish*.

Everywhere extremely abundant near the shore.

URANOSCOPIDÆ.

Genus *ASTROSCOPUS* Brevoort.

26. *Astroscoptes anoplus* (C. & V.) Brev.

One specimen taken by Dr. Cones.

TRIGLIDÆ.

Genus *DACTYLOPTERUS* Lacépède.

27. *Dactylopterus volitans* (L.) Lac.—*Flying-fish*

Rather common. Some ten specimens obtained from fishermen seining in the harbor about Beaufort. The brilliant coloration in life is extremely variable.

Genus PRIONOTUS Lacépède.

23. *Prionotus punctatus* (Bloch) Cuv.—*Slim Flying Toad*.

Two specimens taken.

29. *Prionotus tribulus* C. & V.—*Common Flying Toad*.

Very abundant in Beaufort Harbor. This is doubtless the species mentioned as *Prionotus carolinus* by Dr. Yarrow. Dr. Gill omits this strongly marked species from his Catalogue, apparently confounding it with *P. carolinus* (*palmipes* Storer), which it resembles in color, although its real relations are entirely with *P. evolans*. We have seen no specimens of "*P. carolinus*" from the coast of Carolina, and we do not see how, from the Linnæan description, *P. carolinus* could be distinguished from *P. tribulus*. It becomes, therefore, perhaps an open question whether Linnæus's *Trigla carolina* was *P. tribulus*, or "*P. carolinus*," or both. Linnæus's *Trigla evolans* is apparently equally uncertain, so that the present nomenclature of the species must be accepted as provisional only.

30. *Prionotus evolans* (L.) Gill.—*Striped Flying Toad*.

Abundant in the harbor with the preceding species.

The following is an analysis of the characters of the species of *Prionotus* found in the United States. *P. pilatus* Storer is not included, it being probably identical with *P. carolinus*.

* Mouth small: the mandible not reaching the vertical from the front of the orbit: a distinct transverse groove connecting the upper posterior angles of the orbit: preopercular spine simple, without basal cusp: head short, the spines on its upper part comparatively weak: blotches on spinous dorsal well defined, ocellated. (Subgenus *Prionotus*.)

† Body very slender: sides with numerous roundish brown or bronze spots.

P. punctatus (Bloch) C. & V.

Coloration dark olive above: back and sides covered with numerous round spots of different sizes, and not arranged in series: these spots bronze color in life, becoming brownish after death: spinous dorsal dusky, with lighter streaks: a distinct black spot on upper half of spinous dorsal, between the fourth and fifth spine, this spot being ocellated below and behind: a second black blotch on upper half of first spine and membrane, also ocellated behind: second dorsal and caudal spotted and finely blotched with black: anal largely black, with a pinkish border: pectorals blackish: ventrals pale: branchiostegals pinkish: first dorsal rather high: head $3\frac{1}{4}$ times in length to base of caudal: maxillary one-third length of head. D. X—13, A. 11., lat. l. about 75.

†† Body rather robust: sides with conspicuous round spots.

P. carolinus (L.) C. & V.

Coloration brownish above, clouded with darker: throat and branchiostegal membrane dark: a distinct black blotch on upper half of spinous dorsal, this ocellated below: second dorsal with oblique whitish streaks: preopercular spine strong: pectoral appendages strong, always (?) dilated at their tips: maxillary bone one-third the length of head: head 3 in body. D. X—13, A. 12, lat. l. ca. 55.

******Mouth large, the mandible reaching beyond the vertical from the front of the orbit: no distinct transverse groove between and behind orbits: preopercular spine with a smaller one at base: dark blotches on spinous dorsal diffuse, not ocellated. (Subgenus *Chriolax** nobis.)

‡ Sides of body with one or more distinct dark longitudinal bands: spines on head moderate, compressed.

P. evolans (L.) Gill.

Coloration olive-brown above, mottled and spotted with darker and lighter, whitish below: a narrow dark streak along the lateral line, with a broader one below it, which terminates behind in a series of spots and blotches: lower parts of head sometimes bright orange-yellow: pectorals blackish, surrounded by olivaceous and edged with orange, sometimes with numerous transverse dark lines: a black blotch on membrane of dorsal fin between the third and sixth spines: soft dorsal plain or with two black blotches at base: ventrals and anal deep orange: pectoral appendages slender, dark-colored: spine at upper posterior angle of orbit but little developed: body robust: head $2\frac{1}{2}$ in length. D. X—12, A. 11, lat. l. about 55.

‡‡ Sides without longitudinal bands: spines on head all well developed, those above closely compressed.

P. tribulus C. & V.

Dark brown on sides and above, blotched with darker: a black blotch on membrane of dorsal between the third and sixth spines: second dorsal with several series of brownish spots, these forming oblique bars: soft dorsal with two dark blotches at base, the posterior of which is continued obliquely downwards and forwards to below the lateral line: pectorals olive-brown, with dark bands, which are more distinct towards the tip of the fin: pectoral appendages strong, tapering, marked with series of dark spots: body heavy forwards, short and thick: occipital and supraorbital spines strong and "flattened like sword-blades": head $2\frac{1}{2}$ in length to base of caudal. D. X—12, A. 11, lat. l. about 50.

LABRIDÆ.

Genus TAUTOGA Mitchill.

31. Tautoga onitis (L.) Gthr.—*Oyster-fish*.

Rather common. The young abundant about the wharves at Beaufort.

Genus PUSA Scopoli (fide Gill).

(*Charojulis* Gill; *Halichæres* Rupp.)

32. Pusa grandisquamis Gill.

The original type of this species came from Beaufort. Another was secured by Dr. Yarrow.

33. Pusa sp. (? *radiata* L.).

A young specimen which we supposed to belong to this species, but which was mislaid or lost before we had a full opportunity for comparison, was taken near Captain Duncan's wharf at Beaufort. Its life-coloration was as follows:

Bright green: a dark brown lateral band covering two rows of scales:

* *ypécia*, want: *ōlax*, furrow.

above this, three bronze bands with green interspaces; below it, a band of crimson; these bands running forwards, and meeting on the snout: dorsal fin bright vermillion, with a large blue spot ocellated with yellow near its middle, a smaller dark-blue spot at base of last dorsal ray, and another at base of caudal: anal red, with a yellowish streak: caudal nearly plain: iris red. Length $1\frac{1}{2}$ inches.

Professor Gill informs me that the name *Pusa Scopoli* was first applied to a species of this most beautiful genus. If this be true, it has many years' priority over *Chærojulis*, *Halichæres*, etc.

XIPHIIDÆ.

Genus XIPHIAS Linn.

34. *Xiphias gladius* L.—*Sword-fish*.

'Heard from' off Cape Lookout by Dr. Yarrow.

TRICHIURIDÆ.

Genus TRICHIURUS Linn.

35. *Trichiurus lepturus* L.

Several seen by Cope and Yarrow; none by us.

SCOMBRIDÆ.

Genus SARDA Cuvier.

36. *Sarda pelamys* (L.) Cuv.

Taken off Shackleford Banks (Yarrow). Not seen by us.

Genus ORCYNUS Cuvier.

37. *Orcynus thynnus* (L.) Goode.—*Bonito*.

(*Orcynus secundodorsalis* Gill, l. c.)

Frequently heard of, but not seen by us.

Genus CYBIUM Cuvier.

38. *Cybium maculatum* (Mitch.) Cuv.—*Spanish Mackerel*.

A highly valued food-fish, taken in great numbers in the fall, on the banks. No extensive fishing is done in August, and we did not see this species at Beaufort. A large one leaped on board our steamer in Albe-marle Sound on our return northward.

39. *Cybium regale* (Bloch) Cuv.

One specimen seen by Dr. Yarrow.

CARANGIDÆ.

Genus VOMER Cuvier.

- 40.
- Vomer setipinnis*
- (Mitch.) Ayres.—
- Moon-fish*
- ;
- Sunfish*
- .

Taken on the outer beach in the fall; not seen by us.

Genus SELENE Lacépède.

- 41.
- Selene argentea*
- Lac.—
- Moon-fish*
- .

Taken on the outer beach in the fall; not common; one specimen obtained by us.

Genus ARGYRIOSUS.

- 42.
- Argyriosus vomer*
- Lac.—
- Moon-fish*
- .

Less common (Yarrow). Not seen by us. There seems to be no good evidence that *Argyriosus capillaris* is a species distinct from this.

Genus ALECTRIS Rafinesque.

(*Blepharis*, etc., Cuvier; *Blepharichthys*, etc., Gill.)

- 43.
- Alectris crinitus*
- (Akerly) Jor.

A few individuals taken by Dr. Yarrow; none seen by us at Beaufort. Most of the Scombroid fishes about Beaufort are taken by the fishermen on the outer banks in the fall, and hence escaped our notice.

The genus *Blepharichthys* Gill seems unnecessary, as the prior use of *Blepharis* in Botany does not, in accordance with the general custom of naturalists, prevent its use in Zoölogy. The distinctions between *Blepharis* and *Alectris*, being merely in the degree of obsolescence of the spinous dorsal, do not seem to us important.

Genus CARANGUS Girard.

- 44.
- Carangus chrysus*
- (Mitch.) Gill.—
- Sunfish*
- .

Rather common in Beaufort Harbor. Several young specimens taken among the wharves.

- 45.
- Carangus hippus*
- (L.) Gill.

In Dr. Yarrow's list; not seen by us.

- 46.
- Carangus pisquetos*
- (C. & V.) Gill.

(*Paratractus pisquetos* Gill, l. c.)

One specimen seen by Cones and Yarrow.

Genus TRACHYNOTUS Lacépède.

- 47.
- Trachynotus ovatus*
- (L.) Gthr.—
- Allovericore*
- (
- Albicore*
- ?).

One young specimen taken at Beaufort.

43. *Trachynotus carolinus* (L.) Gill.—*Pampano*; *Stenfish*.

Very abundant on the outer banks. The young go in great schools in the surf, and may be readily taken in a net, and sometimes by hand when thrown on shore by the waves.

Genus *SERIOLA* Cuvier.

(*Halatractus* and *Zonichthys* Gill.)

49. *Seriola zonata* (Mitch.) Cuv.

One specimen observed by Dr. Yarrow; not seen by us. *Naucrates ductor*, included in Dr. Yarrow's list on the strength of information derived from fishermen, we here omit: the species is too easily confounded with the present.

STROMATEIDÆ.

Genus *PORONOTUS* Gill.

50. *Poronotus triacanthus* (Peck) Gill.

Rare; seen by Coues and Yarrow—not by us.

SCIÆNIDÆ.

Genus *CYNOSCION* Gill.

51. *Cynoscion carolinensis* (C. & V.) Gill.—*Speckled Trout*.

An abundant food-fish.

52. *Cynoscion regalis* (Bloch) Gill.—*Sea Trout*.

A common food-fish, although less abundant than the preceding.

Genus *POGONIAS* Lacépède.

53. *Pogonias chromis* Lacép.—*Sea Drum*.

Very common.

Genus *LIOSTOMUS*.

54. *Liostomus xanthurus* Lacép.

Abundant in the fall (Yarrow); not seen by us.

55. *Liostomus obliquus* (Mitch.) DeKay.—*Spot*.

Next to the Mullet, this is the most abundant food-fish about Beaufort, the young swarming everywhere in the harbor. It is universally known as *Spot*, the Robin or Pin-fish being *Lagodon*, and the Hog-fish *Orthopristis*. These vernacular names have been transposed by Dr. Yarrow.

Genus *BAIRDIELLA* Gill.

56. *Bairdiella punctata* (L.) Gill.—*Perch*.

Rather common among the wharves.

Genus SCIÆNOPS Gill.

57. *Sciænops ocellatus* (L.) Gill.—*Drum*.

A rather common food-fish; numerous specimens obtained from the fishermen. One specimen obtained had *two* ocellated spots on the caudal peduncle.

Genus MENTICIRRUS Gill.

58. *Menticirrus littoralis* (Holbr.) Gill.—*Sea Mullet*.

Rather common. The young abundant in the surf on the outer beach, with *Trachynotus carolinus*.

59. *Menticirrus alburnus* (L.) Gill.

Not seen by us.

60. *Menticirrus nebulosus* (Mitch.) Gill.

Not seen. Dr. Yarrow says that this species and the two preceding are "all more or less abundant in the fall, when they are found in company with the Mullet on the sea-beach."

Genus MICROPOGON Cuvier.

61. *Micropogon undulatus* (L.) C. & V.—*Croaker*.

Very abundant; next to Mullet, Spot, and Hog-fish, the commonest food-fish in Beaufort Harbor.

GERRIDÆ.

Genus EUCINOSTOMUS Baird & Girard.

62. *Eucinostomus argenteus* B. & G.

Common in the harbor, along the Beaufort shore. Only very young specimens seen.

PIMELEPTERIDÆ.

Genus PIMELEPTERUS Lacépède.

63. *Pimelepterus bosci* Lac.

A single specimen taken near Duncan's wharf in Beaufort.

SPARIDÆ.

Genus LAGODON Holbrook.

64. *Lagodon rhomboides* (L.) Holbr.—*Robin*; *Pin-fish*.

Excessively abundant everywhere in the harbor. Taken by the thousand by boys with hook and line, from the wharves. This species does not attain a large size, and is seldom used as food in Beaufort, where larger fishes are so plenty. Its value there is about one-tenth of a cent, and it is thrown away by the fishermen. As elsewhere noticed, the "Spot," "Robin," and "Hog-fish" of the fishermen have been in some way misunderstood or confused by Dr. Yarrow.

Genus ARCHOSARGUS Gill.

65. *Archosargus probatocephalus* (Walb.) Gill.—*Sheepshead*.

Abundant; we saw but few specimens, however, the proper Sheeps-head season being passed.

Genus SARGUS Cuvier.

66. *Sargus holbrooki* Bean.—*Spot-tailed Pin-fish*.

Extremely abundant everywhere along the Beaufort shore. This species was first described by Dr. Bean during the past year. That so strongly marked and so abundant a species should have so long escaped notice is very remarkable. Dr. Yarrow does not seem to have noticed it and Dr. Coues obtained but one specimen, the generic characters of which seem to have escaped Professor Putnam's notice, as he speaks of it as "an individual resembling *S. argyrops*," but differing in color. This species has broad incisors and wants the recumbent dorsal spine. Its color is bright silvery, with a large black blotch on the upper part of the caudal peduncle, which is very conspicuous while the fish is in the water. It reaches but a small size, and is not at Beaufort used as food. The fishermen call it Pin-fish, and as such it is beneath their notice. Most of the fishermen, indeed, did not distinguish it from *Lagodon rhomboides*.

Genus STENOTOMUS Gill.

67. *Stenotomus argyrops* (L.) Gill.

Not very common; hardly noticed by the fishermen.

PRISTIPOMATIDÆ.

Genus HÆMULUM Cuvier.

68. ? *Hæmulum arcuatum* C. & V.

Not seen by us; given in Dr. Yarrow's list, but evidently confused with the next species, so that its occurrence at Beaufort is questionable. The proper orthography of the generic name (*αἷμα*, blood; *οὐλον*, gums) is *Hæmulum*, not *Hæmylum*, nor *Hæmulon*.

Genus ORTHOPRISTIS Girard.

69. *Orthopristis fulvomaculatus* (Mitch.) Gill.—*Hog-fish*.

Extremely common everywhere in the harbor.

SERRANIDÆ.

Genus EPINEPHELUS Bloch.

70. *Epinephelus morio* (Cuv.) Gill.

One specimen noted by Dr. Yarrow.

Genus CENTROPRISTIS Cuvier.

71. *Centropristis atrarius* (L.) Barn.—*Black-fish*.

Common, the young abounding about the wharves.

PERCIDÆ.

Genus ROCCUS Mitchill.

72. *Roccus lineatus* (Mitch.) Gill.—*Rock*.

Not seen in Beaufort Harbor, but abundant in all river-mouths, as in New and Neuse Rivers. Dr. Yarrow states that the "young are abundant" in the harbor. As the striped female of *Hydrargyra majalis* is called by all Beaufort fishermen "Rock," and as it is there usually supposed to be the young of the Striped Bass, Dr. Yarrow's statement may perhaps be an error.

Genus MORONE Mitchill.

73. *Morone americana* (Gmel.) Gill.—*White Perch*.

Not found about Beaufort, but said by Dr. Yarrow to abound in the New and Neuse Rivers.

EPHIPPIDÆ

Genus PAREPHIPPUS Gill.

74. *Parephippus faber* (Cuv.) Gill.—*Porgie; Pogy*.

Common; used as a food-fish.

POMATOMIDÆ.

Genus POMATOMUS Lac.

75. *Pomatomus saltatrix* (L.) Gill.—*Blue-fish*.

Extremely common. The taking of this fish is the favorite amusement of the higher grades of summer boarders in this delightful port.

ECHENEIDIDÆ.

Genus ECHENEIS Linnæus.

(*Leptechenis* Gill.)

In 1862 (Proc. Acad. Nat. Sci. Phila. 239), Prof. Gill divided the Linnæan genus *Echeneis* into two genera, *Echeneis* (the slender species: type *E. naucrates* L.) and *Remora* (the stout-bodied species: type *E. remora*). Subsequently (op. cit. 1863, 88), *Remoropsis* (which has not been sufficiently distinguished from *Remora*) and *Rhombochirus* were added. Still later (op. cit. 1864, 60), Prof. Gill found, "on examining the works of Linnæus and Artdi, that *E. remora* was the only species referred to that genus by Linnæus in the early editions of the Systema

Naturæ, and by Artedi, and that in the later editions, Linnæus placed that species at the head of the genus." For that reason, the name *Echeneis* was retained for *E. remora*, and a new name, *Leptecheneis*, conferred on *E. naucrates* and its allies.

As, however, according to the custom now prevalent in Ichthyology, we are not to go behind the tenth edition of the *Systema Naturæ*, and as the placing of a species "at the head of the genus" had no significance with Linnæus, we think that Dr. Gill's first restriction of *Echeneis* should have precedence over the second.

The genera of *Echeneididæ* thus far known are, then, the following:

1. REMORA Gill: type *Echeneis remora* L.; *Echeneis jacobæa* Lowe.
2. REMILEGIA Gill: type *Echeneis australis* Bennett.
3. RHOMBOCHIRUS Gill: type *Echeneis ostcochir* Cuvier.
4. ECHENEIS Linn.: type *Echeneis naucrates* L.
5. PITHEIRICHTHYS Gill: type *Echeneis lineatus* Menzies.

76. *Echeneis naucrates* L.

Two specimens seen by Coues and Yarrow.

Genus REMORA Gill.

77. *Remora jacobæa* (Lowe) Gill.

(*Echeneis remora* L.)

Specimens seen by Dr. Yarrow, taken off Shackleford Banks.

SPHYRÆNIDÆ.

Genus SPHYRÆNA Bloch.

78. *Sphyræna spet* (Hailly) Goode.

Young specimens common in Beaufort Harbor. Our species is usually called *Sphyræna borealis* DeKay, without comparison with allied forms. What fish DeKay had in mind is not clearly known. We identify our Beaufort specimens with *Sphyræna spet* (*Esox sphyræna* L., *Sphyræna vulgaris* Auct.), the common species of Europe and the Middle Atlantic. Whether the West Indian *S. picuda* also occurs northward, to help form the dubious *Sphyræna borealis*, is still uncertain.

MUGILIDÆ.

Genus MUGIL Linnæus.

79. *Mugil brasiliensis* Agassiz.—White Mullet.

Very common in the harbor.

80. *Mugil plumieri* Bloch.—Striped Mullet.

The commonest food-fish of the North Carolina coast; everywhere very abundant on the shoals in the harbor.

Two species of *Mugil* certainly occur on our Atlantic coast, but they have been confounded or misunderstood by nearly all writers except

Dr. Günther, who correctly describes them under the names *Mugil lineatus* and *Mugil brasiliensis*. The nomenclature of both is uncertain. The oldest specific name, *Mugil albula* L., is apparently not available, as its description applies equally to either, and is in some respects incorrect. It is, however, perhaps as applicable to *M. brasiliensis* as that of *Trigla evolans* is to our striped *Prionotus*. The following is Linnaeus's description:

"Mugil Albula. M. pinna dorsali anteriore quadri radiata. D. 4, 9. P. 17. V. $\frac{1}{6}$. A. $\frac{2}{11}$. C. 20, xxx. Habitat in America. D. Garden. Simillimus *M. cephalo*."—(Syst. Nat. xii, i, 520, 1766).

The diagnostic characters and the apparent synonymy of the two species are the following:

***Mugil brasiliensis* Agassiz.**

White Mullet.

? Catesby, ii, pl. 5.

? *Curema* Macgr. 181, Pison 70.

? *Mugil albula* Linn. Syst. Nat. ed. xii, i, 520, 1766.

Mugil brasiliensis Agassiz, Spix, Pisc. Bras. 234, tab. 72 (*fide* Günther).—Günther, Cat. Fishes Brit. Mus. iii, 431.

? *Mugil incilis*, Hancock, Lond. Quart. Journ. Sc. 1830, 127 (*fide* Günther).

Mugil curema Cuv. et Val. xi, 87, and of authors.

Mugil petrosus Cuv. et Val. xi, 89, and of authors.

Mugil lineatus Storer, Hist. Fishes Mass. 89, pl. 16, f. 4 (good).

Body somewhat compressed: angle made by the dentary bones about a right angle: space at the chin between the dentary bones somewhat club-shaped: scales larger, running up on the soft dorsal and anal fins: coloration bluish above, the sides silvery without conspicuous dark stripes, but with shining streaks, produced by the striation of the scales: a dusky blotch at base of pectorals: tips of caudal and soft dorsal blackish. Anal rays III, 9. Scales 38—12. Size less than the next.

***Mugil plumieri* Bloch.**

Striped Mullet.

Mugil plumieri Bloch, t. 296, and of authors.

Mugil lineatus Mitchell, Cuv. et Val. xi, 96, and of nearly all authors.

Mugil albula DeKay, New York Fauna, Fishes, 146.

Mugil berlandieri Girard, U. S. Mex. Bound. Ichth. p. 20, pl. x, fig. 1 (not fig. 4, which represents the young of *M. brasiliensis*).

Body little compressed: angle of mandible obtuse: space between dentary bones broad and short, rounded anteriorly: scales smaller, not running up on the dorsal and anal fins. Coloration dark bluish above; sides silvery, with series of darker spots, one on each scale, forming conspicuous lateral stripes: a dusky spot at base of pectorals. Anal rays III, 8. Scales 42—13. The common "Mullet," so extensively split and salted as a food-fish.

The two species seem to occur on the same shores, and both range from Massachusetts to South Carolina at least.

ATHERINIDÆ.

Genus *CHIROSTOMA* Swainson.

81. *Chirostoma menidium* (Linn.) Gill.—*Sardines*.

We fail to find any evidence that *Chirostoma notatum* (Mitch.) Gill and *C. menidium* are distinct species. Very abundant in the harbor, where it is found generally in company with *Engraulis vittata*, both being known by the fishermen indiscriminately as Sardines.

Genus *ATHERINA* Linnaeus.

82. *Atherina carolina* Val.

A few specimens noted by Drs. Coues and Yarrow.

BELONIDÆ.

Genus *BELONE* Cuvier.

83. *Belone longirostris* (Mitch.) Gill.

Very abundant in Beaufort Harbor.

84. *Belone hians* C. & V.

One specimen obtained. This is a West Indian species, not recorded from our coast until this summer, when Prof. Goode received a number of specimens from the coast of North Carolina. It is probably a resident on our coast, as the specimen taken was quite young.

SCOMBERESOCIDÆ.

Genus *EXOCÆTUS* Linnaeus.

85. *Exocætus melanurus* Val.—*Flying-fish*.

"Occasionally seen" (Dr. Yarrow).

Genus *HALOCYPSELUS* Weinland.

86. *Halocypselus evolans* (Linn.) Gill.

One young specimen taken in Beaufort Harbor.

Genus *HEMIRHAMPHUS* Cuvier.

87. *Hemirhamphus unifasciatus* Ranzani.

Very abundant in the harbor, along the edges of shoals.

Genus *SCOMBERESOX* Lacépède.

88. *Scomberesox scutellatus* Le Sueur.

Recorded by Dr. Yarrow.

CYPRINODONTIDÆ.

Genus CYPRINODON Lacépède.

89. *Cyprinodon variegatus* Lac.—“*Sheep's Head*.”

One specimen seen by us.

Genus FUNDULUS Lacépède.

90. *Fundulus heteroclitus* (Linn.) Gill.

Very common. The species called *F. pisculentus* (Mitch.) Val. and *F. heteroclitus* are unquestionably identical.

Genus HYDRARGYRA Lacépède.

91. *Hydrargyra majalis* (Walb.) Val.—*Rock Fish* (♀).

Very abundant.

92. *Hydrargyra swampina* Lac.

Reported as exceedingly abundant by Drs. Coues and Yarrow.

SYNODONTIDÆ.

Genus SYNODUS Bloch.

93. *Synodus fœtens* (Linn.) Gill.—*Pike*.

Abundant in the harbor.

ALBULIDÆ.

Genus ALBULA Gronovius.

94. *Albula vulpes* (Linn.) Goode.—*Lady Fish*.

(*Albula conorhynchus* Gill, op. cit.)

Reported by Dr. Yarrow on the authority of a fisherman.

ELOPIDÆ.

Genus ELOPS Linnaeus.

95. *Elops saurus* Linn.—“*Horse Mackerel*.”

One very large specimen seen.

Genus MEGALOPS Lacépède.

96. *Megalops thrissoides* (Bl. & Schn.) Günther.

Reported by Dr. Yarrow as very rare, on the authority of fishermen.

CLUPEIDÆ.

Genus BREVOORTIA Gill.

97. *Brevoortia tyrannus* (Latrobe) Goode.—*Fat Back*; *Yellow Tail*; *Bug Fish*.

Very abundant.

Genus *ALOSA* Cuvier.

98. *Alosa sapidissima* (Wilson) Storer.

Probably not found in Beaufort Harbor. Reported by Drs. Coues and Yarrow as excessively abundant in the Neuse River.

Genus *OPISTHONEMA* Gill.

99. *Opisthonema thrissa* Gill.

Several specimens obtained.

Genus *POMOLOBUS* Rafinesque.

100. *Pomolobus pseudoharengus* (Wilson) Gill.

Recorded by Dr. Yarrow as not abundant.

101. *Pomolobus mediccris* (Mitch.) Gill.

Recorded by Dr. Yarrow as abundant.

ENGRAULIDIDÆ.

Genus *ENGRAULIS* Cuvier.

102. *Engraulis vittatus* (Mitch.) Bd. & Girard.—*Sardine*.

Extremely common, occurring in large schools. There is no good evidence that the West Indian *E. browni* (Gmel.) Val. occurs on our coast, or that we have more than one Atlantic species.

SILURIDÆ.

Genus *ÆLURICHTHYS* Baird & Girard.

103. *Ælurichthys marinus* (Mitch.) Bd. & Grd.

Several specimens obtained.

Genus *ARIOPSIS* Gill.

104. *Ariopsis felis* (Linn.) Gill & Jordan.

(*Ariopsis milberti* Gill, op. cit.)

Several specimens seen.

ANGUILLIDÆ.

Genus *ANGUILLA* Thunberg.

105. *Anguilla vulgaris* Turton.—*Eel*.

(*Anguilla bostoniensis* Gill, op. cit.)

Common.

ACIPENSERIDÆ.

Genus ACIPENSER Linnæus.

106. *Acipenser sturio* Linn.—*Sturgeon*.

A large skin found in the harbor near Cape Lookout.

CEPHALOPTERIDÆ.

Genus CERATOPTERA Müller & Henle.

107. *Ceratoptera vampirus* (Mitch.) Gill.—*Devil-fish*.

Fishermen state that they are occasionally found in the harbor.

MYLIOBATIDÆ.

Genus AËTOBATIS Müller & Henle.

108. *Aëtobatis narinari* Müll. & Henle.

One large specimen seen.

Genus MYLIOBATIS Duméril.

109. *Myliobatis fremenvillei* (Les.) Storer.

Tail of one specimen observed.

DASYBATIDÆ.

(*Trygonidae* Gill, op. cit.)

Genus DASYBATIS Rafinesque (fide Gill).

(*Trygon* Gill, op. cit.)

110. *Dasybatis centrurus* (Mitch.) Gill, MSS.—*Sting Ray*; *Stingaree*.

Very common.

Genus PTEROPLATEA Müller & Henle.

111. ? *Pteroplatea maclura* (Le Sueur) M. & H.—*Skate*.

Several specimens about one foot long, the young of some broad species. They do not answer Le Sueur's account of the present species, and there is no trace of a caudal spine, which on a Sting Ray of the same size is fully developed. If not the young of *Pteroplatea*, they will constitute a new genus.

The following are the characters shown by our specimens:

Disk very broad and short, its width nearly twice its length without the tail; tail short, slender and small, its length about one-third that of the disk; a dermal fold above and below; whole disk and tail covered with smooth skin, without spine or roughness of any kind; snout pro-

jecting and pointed; the pectorals broadly expanded on each side, leaving a marked concavity in the outline of the body along their anterior margins on each side, in front of which is a convexity which terminates in the mucronate snout.

Mouth small; teeth triangular, rather pointed; nostrils well apart, confluent with the mouth; a broad flap behind and between them, which seems to form an upper lip.

Color brownish olive, beautifully marbled with grayish, and marked with roundish stellate spots and finer markings of dark brown; edge of disk with rounded pale spots, forming semicircles on the border; tail with four dark blotches above, forming half-rings.

TORPEDINIDÆ.

Genus TORPEDO Duméril.

112. *Torpedo occidentalis* Storer.

Recorded as rare, by Dr. Yarrow, on the authority of fishermen.

RAIIDÆ.

Genus RAIJA Linnæus.

113. *Raja lævis* Mitch.

Recorded by Dr. Yarrow as common.

CARCHARIIDÆ.

Genus CARCHARIAS Rafinesque.

(*Odontaspis* Agassiz; *Eugomphodus* Gill.)

114. *Carcharias americanus* (Mitch.) Jor. & Gilb.

(*Eugomphodus littoralis* Gill, op. cit.)

One pair of jaws seen. The name *Carcharias* has priority over *Odontaspis*, as Dr. Gill has shown, and our species seems hardly generically distinct from the European.

SPHYRNIDÆ.

Genus SPHYRNA Rafinesque.

115. *Sphyrna zygaena* (Linn.) Müll. & Henle.

A single specimen recorded by Dr. Yarrow.

Genus RENICEPS Gill.

116. *Reniceps tiburo* (Linn.) Gill.—*Shovel-headed Shark*; *Bonnet head*.

Abundant.

GALEORHINIDÆ.

Genus SCOLIODON Müller & Henle.

117. *Scoliodon terræ-novæ* (Rich.) Gill.—*Sharp-nosed Shark*.

Very abundant in the harbor.

AMPHIOXIDÆ.

Genus AMPHIOXUS Yarrell.

118. *Amphioxus caribæus* (Sundevall) Jor. & Gilb.

Abundant in the harbor, on Bird Shoal; not, however, obtained by us.

DECEMBER, 1878.

A PARTIAL LIST OF THE BIRDS OF CENTRAL CALIFORNIA.

By L. BELDING, of Stockton.

Edited by R. RIDGWAY.

The present paper is based upon observations extending through about twenty years' residence in California, and collections made chiefly during the last two years, which have, from time to time, been forwarded by Mr. Belding to the National Museum.* The list is believed to be a tolerably complete one, Mr. Belding's long residence in the State and his active interest in ornithology having enabled him to become quite familiar with the bird-fauna of most parts of the interior of California. Still, observations made at a few outlying points, or extended for a longer period at localities already investigated, would, no doubt, add considerably to the number of the species. The editor's remarks are either enclosed in brackets or followed by his initials ("R. R."). He is responsible for the nomenclature adopted, and the determination of the species—although, as to the latter, Mr. Belding had correctly identified them all, with a very few exceptions among the difficult forms, whose correct determination is hardly possible in the field.

The asterisk before the number indicates that the species has been found breeding in Central California; and only those actually ascertained to do so are thus marked. In the list of specimens, the asterisk before the locality shows that the species breeds at that particular place. The number in these lists is that of the National Museum Register, in which the specimens sent by Mr. Belding are entered. Notes upon a few of the species collected by Mr. Belding have been published by the writer in the Bulletin of the Nuttall Ornithological Club for April, 1878, pp. 64-68, to which those interested are referred.—R. R.

* The collections thus far received from Mr. Belding amount to about 180 species (not including races) and 600 specimens. Notes were sent on 38 additional species, making a total of 217 treated in this paper.—R. R.

CENTRAL CALIFORNIA, where the collections and observations upon which this paper is based were made, is divided naturally into three quite distinct parts: (1) the valleys near sea-level; (2) the chaparral belt, familiarly known to Californians as the "foot-hills"; and (3) the ever-green coniferous forests above the chaparral belt. The periods during which the collections were made are as follows:—*At Stockton* (valley region), March 6 to June 9, 1878, and during the succeeding autumn. *At Marysville* (valley region), from December 24, 1877, to March 5, 1878, and, incidentally, in June, 1878. *At Murphy's* (lower edge of pine region), from November 20, 1876, to May 3, 1877, November 22 to December 22, 1877, and August 27 to September 6, 1878. *At the Calaveras Big Trees* (pine region), from May 3 to June 8, and from July 4 to August 27, 1878. *At Soda Springs* (upper part of pine region), from August 25 to October 6, 1877, about a week of this time being spent at the *Summit Meadows*, near the summit of the Donner Lake Pass of the Sierra Nevada.

STOCKTON, SAN JOAQUIN CO. (lat. about 38° , alt. 30 ft.), is on the eastern margin of the extensive tule swamp through which the San Joaquin River flows. Many of the birds peculiar to the inland waters of the Pacific coast frequent this swamp in summer or winter, while others, among which are some of the water birds of the neighboring tule marshes, breed in the willows on the banks or natural levees of the river. During the spring migration, birds are truly abundant in the thickets by the river, and any one who has heard their songs at this time would not accuse California birds of being deficient in melody.

The valley east of Stockton is very level, and sparsely timbered, though the principal water-courses are marked by a narrow strip of oaks and willows. In ordinary winters, water is plentiful, but in summer only the waters of the principal rivers reach the ocean. Owing to this scarcity of water in the breeding season, birds are not numerous in this portion of the valley, while for this and other reasons few species are abundant in Central California.

The climate is genial and quite uniform, the heat of summer being usually agreeably tempered by the sea breeze. The winters are mild and the fields are green with short grass.

MARYSVILLE, YUBA CO., is in latitude $39^{\circ} 8'$, the altitude being about 150 feet above tide-level. It is situated at the junction of the Yuba and Feather Rivers, surrounded by an extensive tract of level plains, most of which are under cultivation. Over the uplands are scattered a few oaks, both evergreen and deciduous, while in the river-bottoms are dense thickets of poplars and willows, with an undergrowth of grape-vines, briars, weeds, and grass. These thickets afford shelter for the birds of the district, and in the breeding season nearly all the species are congregated in or near them.

The summers are warm and dry, and, as elsewhere in the interior of California, the annual plants are either ripe or blighted by the first of

June. The winters are mild; snow rarely falls, the plains after the first rains being covered with grass, which, however, does not grow much until March. Some of the species found at Marysville in winter are the following:—*Turdus nevius*, *T. migratorius* (var. *propinquus*), *T. guttatus*, *Harporhynchus redivivus*, *Mimus polyglottus*, *Dendroica coronata*, *D. auduboni*, *Helminthophaga celata* (var. *lutescens*), *Geothlypis trichas*, *Vireo huttoni*, *Chrysomitris pinus*, *C. laurencii*, *Eremophila alpestris* (both the typical form and var. *chrysolema*), *Sayornis nigricans*, *S. sayus*, *Picus pubescens*,* *P. nuttalli*, *Sphyrapicus ruber*, *Melanerpes formicivorus*, *Asio accipitrinus*, *Speotyto "hypogaea,"* *Lanius borealis*, *L. ludovicianus*, *Melospiza "fallax,"* and *Pipilo chlorurus*. In June, the following, among others, were noticed:—*Turdus ustulatus*, *Thryomanes bewicki* (var. *spilurus*), *Lanivireo "cassini,"* *Vireo pusillus*, *Coccyzus americanus*, *Polioptila caerulea*, *Picus "gairdneri,"* *P. nuttalli*, *Trochilus alexandri*, and *Chamaea fasciata*.

MURPHY'S, CALAVERAS CO. (lat. 38° 7', alt. about 2,400 ft.), is situated at the line of junction of the chaparral belt and the pine region; that is, between the upper edge of the former and the lower limit of the latter, the line between these two districts being sharply drawn by the abrupt rise of the mountains on the east.

The climate of Murphy's is nearly the same as that of Stockton, notwithstanding the great difference of altitude (over 2,300 feet). The days are rather warmer, even in winter, if the sky is unclouded: it is more subject to cold storms, however; but if snow falls, it soon melts, and the hills are invariably covered with green grass after the fall rains. It is above the winter fogs of the valley. The average rainfall at Murphy's averages nearly twice as much as that at Stockton, the rainy season being longer, while the precipitation is more copious.

The following species may be said to find the upper limit to their breeding range in the vicinity of Murphy's:—*Harporhynchus redivivus*, *Chamaea fasciata*, *Polioptila caerulea*, *Lophophanes inornatus*, *Salpinctes obsoletus*, *Icteria longicauda*, *Phainopepla nitens*, *Carpodacus frontalis* (var. *rhodocolpus*), *Chrysomitris laurencii*, *Cyanospiza amœna*, *Pipilo "crissalis,"* *Icterus bullocki*, *Tyrannus verticalis*, *Myiarchus cinerascens*, *Picus nuttalli*, *Melanerpes formicivorus*, *Lanius ludovicianus* (var. *excubitoroides*), *Geococcyx californianus*, and some others. This restriction, though not absolute, is nearly so, and is due mainly to the abrupt change in the character of the forest.

About a mile east of Murphy's, the road makes an unbroken ascent of ten or twelve hundred feet in two miles. For the next thirteen miles there is no material change in the altitude; but at this point there is another rise of about eight hundred feet. At the top of this rise is the "Big Tree" Grove.

* Typical specimen sent from this locality!—R. R.

The following is a list of the birds observed at various times in the immediate vicinity of Murphy's:—

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| 1. <i>Turdus guttatus.</i> | 50. <i>Passercella</i> "megarrhyncha." |
| 2. <i>Turdus naevius.</i> | 51. <i>Passercella</i> "townsendi."* |
| *3. <i>Harporhynchus redivivus.</i> | *52. <i>Hedymeles melanocephalus.</i> |
| *4. <i>Sialia mexicana.</i> | *53. <i>Cyanospiza amena.</i> |
| 5. <i>Sialia arctica.</i> | *54. <i>Pipilo</i> "megalongx." |
| 6. <i>Cinclus mexicanus.</i> | 55. <i>Pipilo chlorurus.</i> |
| 7. <i>Regulus satrapa.</i> | *56. <i>Pipilo</i> "crissalis." |
| 8. <i>Regulus calendula.</i> | *57. <i>Sturnella</i> "neglecta." |
| *9. <i>Poliophtila cœrulea.</i> | *58. <i>Icterus bullocki.</i> |
| *10. <i>Lophophanes inornatus.</i> | *59. <i>Scolecophagus cyanocephalus.</i> |
| *11. <i>Psaltiriparus minimus.</i> | 60. <i>Corvus americanus.</i> |
| *12. <i>Sitta</i> "aculeata." | 61. <i>Cyanocitta</i> "frontalis." |
| 13. <i>Sitta canadensis.</i> | *62. <i>Aphelocoma californica.</i> |
| 14. <i>Certhia</i> "americana." | *63. <i>Tyrannus verticalis.</i> |
| 15. <i>Salpinctes obsoletus.</i> | *64. <i>Myiarchus cinerascens.</i> |
| 16. <i>Catherpes</i> "conspersus." | *65. <i>Sayornis nigricans.</i> |
| 17. <i>Thryomanes</i> "spilurus." | 66. <i>Sayornis sayus.</i> |
| 18. <i>Anthus ludovicianus.</i> | 67. <i>Contopus borealis.</i> |
| 19. <i>Helminthophaga ruficapilla.</i> | *68. <i>Contopus richardsoni.</i> |
| 20. <i>Helminthophaga</i> "lutescens." | *69. <i>Empidonax pusillus.</i> |
| *21. <i>Dendroica aestiva.</i> | 70. <i>Empidonax obscurus.</i> |
| 22. <i>Dendroica auduboni.</i> | 71. <i>Empidonax hammondi.</i> |
| 23. <i>Dendroica coronata.</i> | 72. <i>Ceryle alcyon.</i> |
| 24. <i>Dendroica nigrescens.</i> | *73. <i>Trochilus alexandri.</i> |
| 25. <i>Myiodiodes</i> "pilcolatus." | *74. <i>Calypte annæ.</i> |
| *26. <i>Icteria</i> "longicauda." | 75. <i>Selasphorus rufus.</i> † |
| *27. <i>Progne subis.</i> | 76. <i>Stellula calliope.</i> |
| *28. <i>Petrochelidon lunifrons.</i> | 77. <i>Picus</i> "harrisi." |
| *29. <i>Hirundo</i> "horreorum." | 78. <i>Picus</i> "gairdneri." |
| 30. <i>Stelgidopteryx serripennis.</i> | *79. <i>Picus nuttalli.</i> |
| *31. <i>Vircosylria</i> "swainsoni." | 80. <i>Sphyrapicus</i> "ruber." |
| *32. <i>Phainopepla nitens.</i> | 81. <i>Sphyrapicus thyroideus.</i> |
| *33. <i>Lanius</i> "excubitoroides." | *82. <i>Melanerpes formicivorus.</i> |
| 34. <i>Pyranga ludoviciana.</i> | 83. <i>Melanerpes torquatus.</i> |
| 35. <i>Carpodacus</i> "californicus." | *84. <i>Colaptes</i> "mexicanus." |
| *36. <i>Carpodacus</i> "rhodocolpus." | *85. <i>Scops asio.</i> |
| *37. <i>Chrysomitris psaltria.</i> | 86. <i>Glaucidium gnoma.</i> |
| *38. <i>Chrysomitris lawrencii.</i> | 87. <i>Æsalon columbarius.</i> |
| 39. <i>Chrysomitris pinus.</i> | *88. <i>Tinnunculus sparverius.</i> |
| 40. <i>Passerculus</i> "alaudinus." | 89. <i>Accipiter fuscus.</i> |
| *41. <i>Chondestes grammacus.</i> | *90. <i>Buteo</i> "calurus." |
| 42. <i>Zonotrichia intermedia.</i> | 91. <i>Rhinogryphus aura.</i> |
| 43. <i>Zonotrichia coronata.</i> | 92. <i>Columba fasciata.</i> |
| 44. <i>Junco oregonus.</i> | *93. <i>Zenaidura carolinensis.</i> |
| 45. <i>Amphispiza belli.</i> | 94. <i>Oreortyx picta.</i> |
| *46. <i>Spizella</i> "arizonæ." | *95. <i>Lophortyx californica.</i> |
| 47. <i>Melospiza</i> "guttata." | *96. <i>Ægialitis vocifera.</i> |
| 48. <i>Melospiza lincolni.</i> | 97. <i>Ardea herodias.</i> † |
| 49. <i>Peucaea ruficeps.</i> | 98. <i>Herodias</i> "egretta." |

* In winter only.

† In spring only.

‡ This and the succeeding water birds visit us only in winter and spring. Probably none breed here.

99. *Butorides virescens*.
100. *Nyctiardea "navia."*
101. *Botaurus lentiginosus*.
102. *Ardetta exilis*.
103. *Gallinago wilsoni*.

104. *Tringoides macularius*.
105. *Anas boschas*.
106. *Marcca americana*.
107. *Dytes "californicus."*
108. *Podilymbus podiceps*.

From August 27 to September 5, 1878, forty-two species were observed. Many of the summer residents had gone. Those remaining were—

- | | |
|---|--|
| 1. <i>Turdus migratorius</i> (var. <i>propinquus</i>). | 22. <i>Pipilo "megalonyx,"</i> common. |
| 2. <i>Harporhynchus rufivivus</i> , few. | 23. <i>Pipilo "crissalis,"</i> very common. |
| 3. <i>Sialia mexicana</i> , common. | 24. <i>Sturnella neglecta</i> , common. |
| 4. <i>Polioptila caerulea</i> (only one). | 25. <i>Scolecophagus cyanocephalus</i> , rare. |
| 5. <i>Chama fasciata</i> , common. | 26. <i>Aphelocoma californica</i> , common. |
| 6. <i>Lophophanes inornatus</i> , common. | 27. <i>Cyanocitta "frontalis"</i> (one). |
| 7. <i>Psaltiriparus minimus</i> , common. | 28. <i>Tyrannus verticalis</i> (four). |
| 8. <i>Salpinctes obsoletus</i> , common. | 29. <i>Myiarchus cinerascens</i> (one). |
| 9. <i>Sitta "aculeata,"</i> rare. | 30. <i>Sayornis nigricans</i> , common. |
| 10. <i>Troglodytes "parkmanni,"</i> rare. | 31. <i>Contopus borealis</i> (two). |
| 11. <i>Dendroica aestiva</i> , rare. | 32. <i>Contopus richardsoni</i> , rare. |
| 12. <i>Hirundo "horreorum,"</i> common. | 33. <i>Empidonax pusillus</i> , rare. |
| 13. <i>Petrochelidon lunifrons</i> , very rare. | 34. <i>Calypte annæ</i> , common. |
| 14. <i>Vireosylva "swainsoni,"</i> rare. | 35. <i>Coccyzus americanus</i> (heard one). |
| 15. <i>Phainopepla nitens</i> , rather rare. | 36. <i>Picus nuttalli</i> , common. |
| 16. <i>Lanius "excubitorides."</i> | 37. <i>Melanerpes formicivorus</i> , common. |
| 17. <i>Pyrranga ludoviciana</i> . | 38. <i>Colaptes "mexicanus,"</i> common. |
| 18. <i>Carpodacus "rhodocolpus,"</i> very common. | 39. <i>Rhinogryphus aura</i> , few. |
| 19. <i>Chrysomitris psaltria</i> , very common. | 40. <i>Zenaidura carolinensis</i> , common. |
| 20. <i>Chondestes grammacus</i> , very common. | 41. <i>Oreortyx picta</i> (one seen).* |
| 21. <i>Spizella "arizonæ,"</i> common. | 42. <i>Lophortyx californica</i> , abundant. |

BIG TREES, CALAVERAS CO. (lat. 38° 15', alt. 4,500 ft.), is in the heart of the coniferous forest of the Sierra Nevada. In this locality the pines, firs, cedars, and other conifers attain their largest size and most perfect growth. Deciduous oaks constitute a very small part of the forest, but they are mostly confined to the more barren spots. The climate at Big Trees is agreeably temperate during a portion of May, and throughout June, July, August, and September. The winters are mild, considering the altitude; but snow, to a depth of one to four or five feet, usually covers the ground, although some seasons the surface is bare for the greater portion of the time.

The summer avifauna of this locality resembles, to a considerable extent, that of Soda Springs and Summit Meadows, the more notable absentees being *Pinicola "canadensis,"* *Hesperiphona vespertina*, *Zonotrichia intermedia*, *Picicorvus columbianus*, and *Picoides arcticus*, all of which, however, probably visit Big Trees at some time of the year.

*More were probably present, as a gentleman told me a flock had bred there the past season, on a level with Murphy's.

Birds seen at Big Tree Grove, Calaveras County, from July 4 to August 27, 1878.

- | | |
|--|---|
| *1. <i>Turdus migratorius</i> (var. <i>propinquus</i>), abundant. | *33. <i>Hedymeles melanocephalus</i> , common. |
| 2. <i>Mimus polyglottus</i> , very rare. | *34. <i>Pipilo</i> " <i>megalonyx</i> ," common. |
| *3. <i>Cinclus mexicanus</i> , common. | *35. <i>Pipilo chlorurus</i> , common. |
| *4. <i>Sialia mexicana</i> , common. | 36. <i>Icterus bullocki</i> , very rare. |
| 5. <i>Sialia arctica</i> , rare. | 37. <i>Scolecophagus cyanocephalus</i> , rare. |
| *6. <i>Regulus satrapa</i> , rare. | *38. <i>Cyanocitta</i> " <i>frontalis</i> ," abundant. |
| *7. <i>Parus montanus</i> , common. | 39. <i>Aphelocoma californica</i> , common. |
| 8. <i>Psaltirparus minimus</i> , rather rare. | 40. <i>Tyrannus verticalis</i> , very rare. |
| *9. <i>Sitta</i> " <i>aculeata</i> ," common. | 41. <i>Myiarchus cinerascens</i> , very rare. |
| *10. <i>S. canadensis</i> , decidedly abundant. | 42. <i>Sayornis nigricans</i> , rather common. |
| 11. <i>S. pygmaea</i> , rare. | *43. <i>Contopus borealis</i> , common. |
| *12. <i>Certhia</i> " <i>americana</i> ," abundant. | *44. <i>Contopus richardsoni</i> , common. |
| *13. <i>Troglodytes</i> " <i>parkmanni</i> ," rather rare. | 45. <i>Empidonax pusillus</i> , rare. |
| *14. <i>Helminthophaga ruficapilla</i> , common. | 46. <i>Empidonax obscurus</i> , probably not rare. |
| *15. <i>Helminthophaga</i> " <i>lutescens</i> ," common. | *47. <i>Empidonax hammondi</i> , common. |
| *16. <i>Dendroica aestiva</i> , common. | 48. <i>Empidonax</i> " <i>difficilis</i> ," very rare. |
| *17. <i>Dendroica occidentalis</i> , very common. | 49. <i>Calypte anna</i> , rare. |
| *18. <i>Dendroica nigrescens</i> , in July, rare. | 50. <i>Trochilus alexandri</i> , rare. |
| 19. <i>Dendroica auduboni</i> , rare. | 51. <i>Stellula calliope</i> , rare. |
| *20. <i>Gothlypis macgillivrayi</i> , common. | 52. <i>Sceloporus rufus</i> , common. |
| 21. <i>Myiiodiodes</i> " <i>pileolatus</i> ," common in August. | *53. <i>Picus</i> " <i>harrisi</i> ," common. |
| *22. <i>Hirundo</i> " <i>horreorum</i> ," common. | *54. <i>Picus</i> " <i>gairdneri</i> ," rather rare. |
| 23. <i>Petrochelidon lunifrons</i> , rare. | *55. <i>Picus albolarvatus</i> , abundant. |
| 24. <i>Tachycineta thalassina</i> , abundant. | *56. <i>Sphyrapicus</i> " <i>ruber</i> ," quite abundant. |
| *25. <i>Vireosylva</i> " <i>swainsoni</i> ," common. | *57. <i>Hylotomus pileatus</i> , not rare. |
| *26. <i>Lanius</i> " <i>cassini</i> ," common. | 58. <i>Melanerpes formicivorus</i> , very rare. |
| *27. <i>Pyrranga ludoviciana</i> , common. | *59. <i>Colaptes</i> " <i>mexicanus</i> ," common. |
| *28. <i>Carpodacus</i> " <i>californicus</i> ," very common. | *60. <i>Bubo</i> " <i>subarcticus</i> ," common. |
| 29. <i>Chrysomitris psaltria</i> , rare. | 61. <i>Glaucoedon gnoma</i> , rare. |
| 30. <i>Chrysomitris pinus</i> , rare. | 62. <i>Tinnunculus sparverius</i> , rather rare. |
| *31. <i>Spizella</i> " <i>arizona</i> ," abundant. | *63. <i>Zenaidura carolinensis</i> , common. |
| *32. <i>Passerella</i> " <i>megalyneha</i> ," common. | *64. <i>Canace obscura</i> , rather rare. |
| | *65. <i>Oreortyx picta</i> , common. |
| | *66. <i>Lophortyx californica</i> , common. |

From May 3 to June 8, 1877, I found, in addition to most of those found in July and August, the following species:—

- | | |
|--|---|
| 1. <i>Lanius</i> " <i>excubitorides</i> ," rare. | 4. <i>Sturnella neglecta</i> , rare. |
| 2. <i>Carpodacus cassini</i> , common. | 5. <i>Corvus americanus</i> , irregular visitors. |
| 3. <i>Melospiza lincolni</i> , rare. | 6. <i>Thryomanes</i> " <i>spilurus</i> ," rare. |

The Hawks and Owls peculiar to the mountains of California are probably as numerous here as in other parts of the Sierras, but the density and height of the forest make their capture difficult.

At Moran's and Dunbar's Meadows, two or three miles west, and about 800 feet lower, I found the following in July and August, 1878:—

- | | |
|---|---|
| 1. <i>Chondestes grammia</i> , common. | 3. <i>Sturnella neglecta</i> , common. |
| 2. <i>Xanthocephalus icterocephalus</i> (one juv. August 27). | 4. <i>Ceryle alcyon</i> , rare. |
| | 5. <i>Tringoides macularius</i> (one), very rare. |

I arrived at Big Trees May 3, 1877, and by May 10 nearly all the summer residents had arrived. Some of them had preceded me. Many of them, especially the Warblers, were seen on the route from Murphy's to this place.

The spring of 1877 was earlier than that of 1878, the winter of the former year having been very dry and mild. This probably accounts for the difference in the arrivals of some of the birds, as shown by the following figures. Probably I did not see some of them until some time after their arrival, especially if rare.

Number.	Name of species.	Arrival of birds at—	
		Murphy's, 1877.	Stockton, 1878.
1	<i>Helminthophaga ruficapilla</i>	April 11	.....
2	<i>Helminthophaga "lutescens"</i>	20	April 22
3	<i>Dendroica nigrescens</i>	15	17
4	<i>Dendroica aestiva</i>	26	15
5	<i>Myiodytes "pileolata"</i>	18	May 6
6	<i>Vireosylva "swainsoni"</i>	26	1
7	<i>Hirundo "horreorum"</i>	March 15	March 20
8	<i>Petrochelidon lunifrons</i>	15	17
9	<i>Stelgidopteryx serripennis</i>	15	.....
10	<i>Progne subis</i>	13	March 16
11	<i>Icterus bullocki</i>	24	April 1
12	<i>Hedymeles melanoccephalus</i>	May 1	May 6
13	<i>Pyrranga ludoviciana</i>	April 30	.....
14	<i>Phainopepla nitens</i> (arrived at Jenny Lind, March 12, 1874)	March 13	.....
15	<i>Spizella "arizonae"</i>	April 17	May 1
16	<i>Tyrannus verticalis</i>	12	March 20
17	<i>Myiarchus cinerascens</i>	17	April 27
18	<i>Empidonax obscurus</i>	28	.....
19	<i>Empidonax "hammondi"</i>	25	May 9
20	<i>Pipilo chlorurus</i>	17	.....
21	<i>Potioptila cerulea</i>	5	March 23

SODA SPRINGS, PLACER CO.—This place is on the North Fork of the American River, ten miles south of the Central Pacific Railroad, on the west side of the "divide," or crest-line, of the Sierra Nevada; Lake Tahoe being on the east side, ten or fifteen miles distant. Altitude of the springs, 6,009 feet; the latitude, 39° 11'. The mountains between this place and Lake Tahoe rise 2,500 or 3,000 feet higher. This is above the region of deciduous oaks, the trees being all evergreens, except a species of dwarf maple and a few alders, willows, and aspens, which grow along the river. It is a rugged, almost desolate, region, though an interesting one. Grouse and Mountain Quails are comparatively plentiful, and trout-fishing is quite good. The Warblers are well represented here: I have found here the young of *Dendroica auduboni*, *D. occidentalis*, *D. nigrescens*, *Helminthophaga ruficapilla*, *H. eclata*, and other species.

On frosty mornings in September, birds were exceptionally numerous in a few of the more sunny glades along the river, consisting chiefly of *Junco oregonus*, *Spizella breweri*, *S. socialis*,* *Zonotrichia intermedia*, *Passerella megarhyncha*, *Pipilo chlorurus*, *Parus montanus*, *Dendroica auduboni*, etc., etc. The Humming-birds fled when the first frost killed the flowers.

* Certainly both species.—L. B.

[The following species, all of which are known to occur in some part of California, have not been met with by Mr. Belding in the central portion of the State. Many of them are very local, while others occur only in certain districts, at particular seasons.—R. R.]

Poliophtila melanura,* Lawr.

Poliophtila plumbea,* Baird.

Parus occidentalis,† Baird.

Parus rufescens,‡ Towns.

Cotyle riparia, (Linn.).

Vireo vicinior,* Coues.

?*Loxia leucoptera*,§ Gmel.

Ægiothus linaria,§ (Linn.).

Leucosticte littoralis,§ Baird.

?*Centrophanes lapponicus*,§ (Linn.).

Passerculus anthinus,‡ Bonap.

Passerculus rostratus,|| (Cass.).

Coturniculus perpallidus,¶ Ridgw.

Molothrus ater, (Bodd.).

Corvus carolinensis, Bart.

Corvus caurinus,‡ Baird.

Chatura vauri, (Towns.).

Nephacetes borealis, Kennerly.

Calypte costae,* (Boarc.).

Selasphorus alleni,‡ Henshaw.

Pandion carolinensis, Gmel.

Astur atricapillus,§ (Wils.).

Squatrola helvetica, (Linn.).

Charadrius virginicus, Börek.

Ægialitis semipalmata, Bonap.

Ægialitis nigra, Cass.

Phalaropus fulicarius, (Linn.).

Ereunetes pusillus.

Tringa bairdi, Coues.

Tringa maculata, Vieill.

Colymbus torquatus, Brünn.

Colymbus pacificus, Lawr.

Colymbus septentrionalis, Linn.

Podiceps hötblölli, Reinh.

Family TURDIDÆ: The THRUSHES.

* 1. *Turdus migratorius*, β. *propinquus*, Ridgw.—*Western Robin*.

This bird visits the valleys only in winter, when it is sometimes abundant, especially during the coldest weather. In summer it is rarely seen out of the pine forests, though about the first of September, 1878, twenty-five or thirty were observed in an orchard at Murphy's.

It was first seen** at Stockton, October 21, 1878.

73866	♂ ad.	*Murphy's	Apr. —, 1877
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2. *Turdus naevius*, Gm.—*Varied Thrush*.

This bird arrives at Stockton about the middle of November and leaves in March or April, according to the season. It arrived at Soda Springs, October 1, 1877.

It is usually a common winter sojourner of the foot-hills, and also of

* Probably confined to the southern portion of the State.

† Found among the oaks of the plains east of Sacramento, in June, 1867, by the writer; common.

‡ Probably confined to the coast district.

§ Undoubtedly occur on the high Sierras in winter.

|| Found by Mr. Belding at Santa Cruz, September, 1870.

¶ Common at Sacramento, in June, 1867.

** Sometimes, for the sake of variety, the word "arrived" is used. This, in all cases, must necessarily be but a substitute for the word "seen," or "first seen." Though, when constantly in the field, as was the case at Murphy's in the spring of 1877, and at Stockton in the spring of 1878, if *common*, a species was probably seen soon after its arrival. "Was seen," means by myself. The birds were all shot by me, unless credited to others.

the valley, in suitable localities, but I did not find it at Murphy's from the middle of November, 1876, to May, 1877, though the following November and December it was abundant there.

Its alarm-note is a short "chook," its call a prolonged, nearly monotonous "chee," or "yee," and I have heard it sing sweetly about March 1. I once mistook its call for the bleating of a distant lamb, although the bird was not far from me.

73867	♂ ad.	Soda Springs.....	Oct. 1, 1877
73868	♂ ad.	do	Oct. 1, 1877
73869	♂ ad.	Murphy's.....	Oct. 1, 1877
76573	♂ ad.	Stockton.....	Nov. 8, 1878
76534	♂ ad.	do	Nov. 8, 1878

* 3. *Turdus ustulatus*, Nutt.—*Russet-backed Thrush*.

About a dozen of this species were seen in the willows at Marysville in June, 1878, and there were probably many more, as their songs were heard on several occasions in different parts of a thicket of willows, briers, etc. I am not aware of meeting it elsewhere. Its delicious song is not likely to be forgotten by one who has heard it.

74431	.....	*Marysville.....	June 22, 1878
76537	.....	do	June 14, 1878

4. *Turdus guttatus*, (Pall.).—*Dwarf Thrush*.

The Dwarf Thrush is probably a constant resident at Stockton, as it is common in winter and as late as June 8, 1878, at this time being confined to thickets near water. In winter it is more generally distributed, being often seen in gardens. It, or a near relative, is abundant at Murphy's in winter, and leaves that place in April.*

It seems to be very rare in the Sierras in summer, during which I have not been able to find it at Big Trees. Two or three were noticed at Soda Springs, all of them on and after September 22, 1877.

73870	— ad.	Marysville?.....	Winter, 1877
76535	— ad.	Murphy's.....	Winter, 1877
76536	♀ ad.	Stockton.....	May 30, 1878

* 5. *Mimus polyglottus*, (Linn.).—*Mocking-bird*.

A single bird of this species, in first plumage, was shot July 22, at "Big Tree Grove." It appears to be a constant resident of Marysville, where it has long been known to breed. A pair were often seen by a friend in Stockton during the past winter, and there are several young birds here that were taken from their nests at Hornitos, Mariposa Co. Still, it is by no means a common bird in this region.

A specimen was seen in a garden at Stockton on the 24th of December, 1878.

Nearly any citizen of the valley will, on being asked, say he knows the

* Quite certainly the present species.—R. R.

Mocking-bird, but when asked to describe it, gives the description of the Sickie-bill Thrush or the Black-headed Grosbeak, or, occasionally, the Long-tailed Chat.*

73609	— ad.	*Marysville.....	Dec. 26, 1877
76361	— juv.	*Big Trees.....	July 22, 1878

6. *Oreoscoptes montanus*, (Towns.).—*Sage Thrasher*.

About October 1, 1877, at Soda Springs, I saw a strange Thrush, which may have belonged to this species, as I do not know what else it could have been. I had a good view of it, but did not shoot, because too near. I began to walk away from it, when it went into the bushes by the river. It had been sitting six or eight feet from the ground on a dead limb of a tree. When it flew, its course was downward, toward the thicket, a few feet distant.

* 7. *Harporhynchus redivivus*, (Gamb.).—*Sickie-bill Thrasher*.

The Sickie-bill Thrasher is a constant resident at Stockton, Murphy's, and Marysville, and is very common in the chaparral belt. It is rare at Stockton, for want of suitable ground.

73786	♂ ad.	*Marysville.....	Jan. —, 1878
74268	♂ ad.	*North American.....	Mar. 15, 1878
73871	— ad.	*Murphy's.....	Mar. 15, 1878

Family CINCLIDÆ: The WATER OUZELS.

* 8. *Cinclus mexicanus*, Swains.—*American Water Ouzel; Dipper*.

This bird is in summer abundant in the clear streams of Calaveras Co., shunning those which have been muddied by mining operations.

I have several times seen it swim across the surface of one of the abandoned mining claims at Murphy's, and, while fishing for trout in the streams of the Upper Sierras, have often seen it swim on the surface—at times floating with the rapid current; but it is proper to mention that this is not its usual habit. It sometimes swims a distance of twenty or thirty yards in still water. It is an occasional winter visitant to Murphy's, below which I have never seen it.

73531	— ad.	*Soda Springs.....	Sept. —, 1877
73874	— ad.	Murphy's.....	Winter, 1877

Family PTILOGONATIDÆ: The PTILOGONIES.

* 9. *Myiadestes townsendi*, (Aud.).—*Townsend's Solitaire*.

This appears to be a habitual visitant to Soda Springs in the fall, if not a summer resident, as I have found it common during each of several

* A similar confusion of names prevails to a considerable extent in many parts of the Eastern States, where, however, the bird most commonly confounded with the Mocking-bird is the Loggerhead Shrike, *Lanius ludovicianus*.—R. R.

visits I have made to the place in different years, and once shot a young one there as early as August 1.

It is a rather rare summer resident at Big Trees, owing, probably, to the absence of its favorite food, the juniper-berry. Once, while calling a companion with a policeman's whistle, I heard a shrill note in the small oak-tree under which I stood. Looking up, I discovered the author of the note, a male of this species, which had evidently been attracted by the whistle, and was answering my call.

73610	♂ ad.	*Big Trees.....	May 4, 1877
73872	— ad.	Soda Springs.....	Autumn, 1877
73873	— ad.	.....do.....	Autumn, 1877
75312	— juv.	Big Trees.....	July 13, 1875

* 10. *Phainopepla nitens*, (Sw.).—*Black Ptilogony*.

This is a rather common summer resident of the chaparral belt, out of which I have not seen it. It was observed several times on July 4, between Milton and Murphy's. I shot a male near Jenny Lind, toward the close of the hunting season of 1874, not later than March 12. Early in April I have found it mated at Copperopolis, Calaveras Co.

Its manners are well described by Dr. Cooper in the Ornithology of California. The young in this collection was gorged with berries of the "wild coffee" of Murphy's, which differs slightly from that of Big Trees. This berry is about half an inch in diameter, very round, red just before ripe, black when ripe.

73534	♂ ad.	*Murphy's.....	Mar. 13, 1877
75313	— juv.	.....do.....	Aug. 29, 1878

Family SAXICOLIDÆ: The SAXICOLAS.

* 11. *Sialia mexicana*, Sw.—*Californian Bluebird*.

The Californian Bluebird is a common constant resident of the valleys and foot-hills, and is also common as high at least as Big Trees in summer. It arrives at Big Trees about the middle of May. There it is principally confined to the fields or meadows and their borders.

73879	♂ ad.	*Murphy's.....	Winter, 1877
73880	♂ ad.	.....do.....	Winter, 1877
73881	♂ ad.	.....do.....	Winter, 1877
73882	♂ ad.	.....do.....	Winter, 1877
76362	♂ juv.	*Big Trees.....	Aug. 20, 1878
76363	♂ juv.	.....do.....	Aug. 20, 1878
76538	♂ ad.	Murphy's.....	Winter, 1877

* 12. *Sialia arctica*, Sw.—*Rocky Mountain Bluebird*.

This bird is an irregular winter visitant to the foot-hills and valleys. It was first noticed at Stockton in the fall of 1878, on October 28. It was common in the following November, showing a partiality for fences along roads, sometimes perching on telegraph wires, seldom being seen on trees. A flock was seen March 12, 1878, thirty miles east of Stock-

ton, and a few, principally young of the year, visited Big Trees, August 20 of this year (1878). It was abundant in the middle of September at Summit Meadows, and was quite common during the same month at Soda Springs. I did not see it at Marysville in the winter of 1877-78.

[Respecting the two species of Bluebirds, Mr. Belding writes, under date of January 15, as follows:—"Is it not remarkable that *S. mexicana* is now in the mountains and *S. arctica* in the lowlands? The former more common than the latter, at least when I left the valley. As snow is now two feet deep at Big Trees, *S. mexicana* has probably left."—R. R.]

73883	♂ ad.	Murphy's.....	Feb. 15, 1877
76539	♀ ad.	Stockton.....	Oct. 28, 1878

Family SYLVIIDÆ: The TRUE WARBLERS.

13. *Regulus calendula*, (Linn.).—*Ruby-crowned Kinglet*.

This is a very common winter sojourner in the foot-hills and valleys. I have not seen it at Big Trees in summer, though abundant at Soda Springs the last of August and afterward.

By the middle of April, 1878, it was very rare at Stockton. The first seen the following fall was on the 3d of October.

73877	♂ ad.	Murphy's ..	— —, 1877
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14. *Regulus satrapa*, Licht.—*Golden-crowned Kinglet*.

This bird was seen on several occasions at and near Big Trees in July and August, though not more than eight or nine in all. I had seen five or six at Soda Springs about October 1, 1877, and about the same number at Murphy's in December of the same year, but nowhere was it so numerous as at Stockton.

On the 15th of November, 1877, I found a flock of thirty or forty associated with a smaller number of *R. calendula*, and three days afterward saw a flock about as large about four miles from the spot where I had seen those on the 15th. These were also associated with a smaller number of *R. calendula*.

73535	♂ ad.	Stockton	— —, 1877
75298	— juv.	" Moran's (altitude 3,800)	July 26, 1878
76540	♂ ad.	Stockton	Oct. 28, 1878
76541	♂ ad.	" do	Nov. —, 1878

15. *Polioptila cœrulea*, (Linn.).—*Blue-gray Gnatcatcher*.

This is a rather common summer resident of Murphy's, and it was quite numerous at Marysville in June; at the former place frequenting the chaparral, at the latter, the willows. It was first seen at Murphy's April 5, 1878; at Stockton, March 23. It is rare at Stockton, and was not seen there during the breeding season. Several were seen here in August, 1877, but one was seen at Murphy's in parts of August and September.

Last spring I heard a pair uttering cries of distress, and found upon proceeding to the spot a Blue Jay about to rob their nest. I shot the Jay, which was only about fifteen or twenty yards from me, when the male Gnatcatcher immediately came and perched on a bush not more than five or six feet distant, a little above my head, and poured forth a loud, cheery, musical strain of thankfulness (as it seemed to me), such as I did not think the little bird capable of producing.

A nest found at Murphy's was in the forks of a small pine-tree about fifteen feet from the ground, or less.

73878	♂ ad.	*Murphy's.....	Apr. 5, 1877
73884	♂ ad.	do	Apr. 5, 1877
76546	♂ ad.	Stockton.....	Mar. 23, 1878
76547	♂ ad.	Marysville.....	June —, 1878

Family PARIDÆ: The TITMICE.

* 16. *Lophophanes inornatus*, (Gamb.).—*Plain Titmouse*.

This bird is a common constant resident of the valleys and foot-hills. I have not seen it in the pine forests. A nest found at Stockton, May 29, was in the cavity of an elongated oak knot, eight feet from the ground. In drawing the nest out with a stick, the eggs were broken—the number was four, the color white.* The bird had been sitting about a week. While the nest was being taken, the occupant, having retreated to the central hollow of the trunk of the large oak of which the knot formed a part, appeared a few feet above me, and silently watched the proceedings.

73885	— ad.	Murphy's.....	Apr. 5, 1877
74256	♂ ad.	Stockton.....	Apr. 17, 1878
74257	♂ ad.	.....do	Apr. 9, 1878

* 17. *Parus montanus*, Gamb.—*Mountain Chickadee*.

This is a very common summer resident of Big Trees, and I have found it abundant at Soda Springs and Summit in the fall. Big Trees is nearly the lower limit of its breeding range.

I have found three nests, all in low, decayed stumps, two of them in a clearing, one in open forest. All were composed of wool, a considerable quantity of which had been used in their construction. The eggs are pure white.† Seven appears to be about the usual number. The young birds, when nearly ready to leave the nest, hiss, as their parents do, when disturbed on the nest.

In December, 1878, I saw a flock of this species at Copperopolis (alt. about 1,200 ft.), the first I have seen in the chaparral belt.

73886	— ad.	Big Trees	May —, 1877
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* The eggs of this species, usually plain white, are sometimes, though rarely, spotted, like those of *L. bicolor*.—R. R.

† A curious fact; in all other American species of this genus, so far as known, they are heavily speckled with reddish brown.—R. R.

*18. *Psaltiriparus minimus*, (Towns.).—*Least Tit*.

The Least Titmouse is a common constant resident of the valleys and foot-hills. A few flocks were seen at Big Trees in July and August, though only at rare intervals.* I have not seen it above Big Trees.

73887	— ad.	*Murphy's	Apr. —, 1877
73888	— juv.	do	Apr. 20, 1877
74433	♀ ad.	*Stockton	May 8, 1878
75299	— ad.	Big Trees	July 13, 1878

Family SITTIDÆ: The NUTHATCHES.

*19. *Sitta carolinensis*, β. *aculeata*, Cass.—*Slender-billed Nuthatch*.

This Nuthatch has not been abundant at any place where I have made collections, though often seen at all of them, especially in the pine forests. It was quite common in the groves of deciduous oaks near Stockton in May and the first week of June, 1878, and I supposed they had nests, but was unable to find them.

73608	♀ ad.	*Marysville	Jan. 5, 1878
73889	♂ ad.	Calaveras County	— —, 1877
73890	♂ ad.	do	— —, 1877
73891	♀ ad.	do	— —, 1877
76258	♂ ad.	*Stockton	Apr. 9, 1878

*20. *Sitta canadensis*, Linn.—*Red-bellied Nuthatch*.

This bird is abundant at Big Trees in summer, probably outnumbering the Robins or Jays. I found it rather rare at Soda Springs in the fall of 1877. It is occasionally seen at Murphy's in winter, and is a very rare winter visitant to the valleys.

73034	♂ ad.	*Big Trees	May 19, 1878
73892	♀ ad.	Murphy's	Mar. 3, 1877
73893	♀ ad.	do	Mar. 3, 1877
76548	♀ ad.	Stockton	Nov. 5, 1878

*21. *Sitta pygmæa*, Vig.—*Pigmy Nuthatch*.

This bird seems to be very rare in Central California. I first met with it at Big Trees in July, having been drawn to it by its notes. It was then associated with *S. canadensis*.

I saw it only on two occasions, in July and August, the total number seen being only about a dozen.

75300	— juv.	*Big Trees	July 25, 1878
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Family CERTHIIDÆ: The CREEPERS.

*22. *Certhia familiaris*, β. *americana*, Bonap.—*American Brown Creeper*.

This bird is an abundant summer resident at Big Trees, and is rather common in the fall at Soda Springs. It is a rare winter visitant to the

* Probably this and other species after breeding in the foot-hills, seeking to escape from the heat and drouth of midsummer, enter the cool shades of the cañons and streams which lead eastward and upward.

valleys. I saw two of these birds at Marysville in January and February, 1878, and a pair was seen at Stockton October 27, 1878.

73899	— ad.	Murphy's.....	Spring, 1877
73900	— ad.	*Big Trees.....	Spring, 1877

Family CHAMÆIDÆ: The GROUND TITS.

* 23. *Chamæa fasciata*, Gamb.—*Ground Tit*.

This bird is a constant resident at Murphy's, Stockton, and Marysville. At the two latter places it inhabits the willow thickets, where, however, it is not numerous. It is very common at Murphy's in the chaparral thickets.

Its perfect spring song consists of three loud, high, staccato notes, immediately followed by a trill, starting in the same key, gradually descending about a minor third, the whole song occupying six or eight seconds of time.

73876	— ad.	*Murphy's.....	Apr. —, 1877
74253	♀ ad.	*Stockton.....	Apr. 13, 1878
74254	♂ ad.	.... do	Apr. 2, 1878
74255	♂ ad.	.... do	Mar. 30, 1878

Family TROGLODYTIDÆ: The WRENS.

* 24. *Salpinctes obsoletus*, (Say).—*Rock Wren*.

The Rock Wren is a common constant resident at Murphy's. I have also seen it at Copperopolis, Calaveras Co., in April and December. I have not seen it in the pine forests.

73895	— ad.	*Murphy's.....	Dec. —, 1877
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25. *Catherpes mexicanus*, *β. conspersus*, Ridgw.—*Cañon Wren*.

This Wren was quite common at Murphy's in February and the first half of March, 1877. It was much given to penetrating the piles of broken rocks in the abandoned mining claims, and was with difficulty shot, and then at close range only. I have not seen it on the dry hills frequented by *Salpinctes obsoletus*. I have observed it only at Murphy's, at the time stated, and not elsewhere, though there is but little suitable ground where I have been. There are many places on the Calaveras River, in the chaparral belt, where it should be found, but these localities I have not visited in many years.

73035	— ad.	Murphy's	Feb. 7, 1877
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* 26. *Thryomanes bewicki*, *β. spilurus*, (Vig.).—*Californian Bewick's Wren*.

This Wren is an abundant constant resident at Marysville, where it inhabits the willow thickets along the streams. I have not found it

abundant elsewhere, though it is rather common in spring at Murphy's, where it is occasionally seen in winter also.

At Marysville, in the summer of 1878, a pair of these birds raised a brood of young in a seam of one of the timbers of a railroad trestling, notwithstanding frequent jars from passing trains. The nest was about two feet below the rails.

73632	— ad.	Calaveras County.....	Jan. 5, 1878
73895	— ad.	*Marysville.....	Winter, 1877-8
73896	— ad.	.... do	Winter, 1877-8
73897	— ad.	.... do	Winter, 1877-8
73898	— ad.	.... do	Winter, 1877-8
76542	— ad.	Stockton.....	May 8, 1877

* 27. *Troglodytes ædon*, β . *parkmanni*, Aud.—*Parkmann's Wren*.

I have not seen more than a dozen of these birds while making this collection. Most of these were at Big Trees.

76304	— juv.	*Big Trees	July —, 1878
76543	— juv.	Stockton	June 3, 1878
76544	— juv.	.... do	Oct. 28, 1878

28. *Troglodytes hyemalis*, β . *pacificus*, Baird.—*Californian Winter Wren*.

77078	— ad.	Murphy's.....	Jan. 6, 1879
77079	— ad.	.....do	Jan. 6, 1879

* 29. *Telmatodytes palustris*, β . *paludicola*, Baird.—*Western Long-billed Marsh Wren*.

This Wren is an abundant constant resident of the tule marshes near Stockton. In the breeding season I have examined more than twenty nests without finding an egg, though the anxious or angry owner or owners would follow me closely, constantly scolding, as I examined each nest, as though having an equal interest in all.

73839	— ad.	Marysville	Dec. —, 1877
74432	— ad.	*Stockton	June —, 1878
76545	— juv.	.... do	Sept. 29, 1878

Family MOTACILLIDÆ: The WAGTAILS and TITLARKS.

30. *Anthus ludovicianus*, Gmel.—*American Titlark*.

The Titlark is a common winter sojourner of the valleys and foot-hills. I saw a flock of these birds near Murphy's, 3,400 feet above the sea, on the 10th of December, 1877. It left Stockton about May 1, 1878, and returned September 18 of the same year, at which time it was only found in the edge of the tule swamp, but soon became distributed through the surrounding country. It has not, up to the present time (November 27), appeared in the streets, as is its usual custom in winter.

73875	— ad.	Murphy's	Mar. 3, 1877
76549	— ad.	Stockton.....	Sept. 18, 1878

Family MNIOTILTIDÆ: The AMERICAN WARBLERS.

*31. *Helminthophaga ruficapilla*, (Wils.).—*Nashville Warbler*.

This Warbler arrived at Murphy's April 11, 1877, and was rather common the remaining portion of the month, frequenting the deciduous oaks on sunny hillsides, outnumbering at that time any of the Warblers except *D. auduboni*. In the pine forests it frequents low bushes.

A nest found at Big Trees in May was built on the ground in a thick growth of an evergreen shrub. It was formed of pine-root fibres, and contained five eggs, white, thickly spotted with reddish brown, mostly concentrated on the large end, forming a prominent ring.

It does not breed much below Big Trees—I have not seen it in the valley, its range extending from 2,500 feet upward.

73036	♂ ad.	Murphy's.....	Apr. 1, 1877
73037	♂ ad.	do	Apr. 1, 1877
73038	♂ ad.	*Big Trees	May —, 1877
73624	♂ ad.	Soda Springs.....	Autumn, 1877
73536	♂ ad.	Murphy's.....	July 16, 1878
75338	— juv.	Big Trees.....	July 16, 1878
75309	— juv.	do	July 16, 1878

*32. *Helminthophaga celata*, β . *lutescens*, Ridgw.—*Californian Orange-crowned Warbler*.

This bird was first noticed at Murphy's on the 20th of April, 1877, and was rather common until about May 1. A few were seen at Stockton April 22, 1878, after which time it was rarely seen—in no instance after May 10.*

A few were seen on different occasions in January and February, 1878, in the wild-grape and brier patches of the bottom-lands near Marysville.

In spring it feeds among the deciduous oaks. Later in the season, in the pine forest, it is confined to low shrubbery.

It is a common summer resident of Big Trees,† and is abundant at Soda Springs in fall.

73613	— juv.	*Big Trees	May —, 1877
73614	— ad.	Marysville	Jan. 8, 1878
73925	— ad.	Soda Springs.....	Autumn, 1877
73926	— juv.	do	Autumn, 1877
74006	— juv.	Big Trees	May —, 1877
73791	♂ ad.	Marysville.....	Feb. 14, 1878
76550	♀ ad.	Stockton.....	Apr. 22, 1878

*33. *Dendroeca æstiva*, (Gmel.).—*Yellow Warbler*.

This well-known species is common in the valleys and foot-hills in summer, and is often met in the pine forests during the same time, where it is principally confined to the willows and aspens in and around meadows. It arrived at Murphy's April 26, 1877, and at Stockton April 15, 1878, at which time Mt. Diablo and the "Coast Range" were white

*Under date of December 28, 1878, Mr. Belding writes that it was then found at Stockton, but was rare.—R. R.

†Its breeding range scarcely extends below this altitude.

with an unusually late fall of snow. It left Stockton previous to September 7, 1878.

73908	— ad.	*Big Trees	Spring, 1877
73909	— ad.	.... do	Spring, 1877

34. *Dendroeca coronata*, (Linn.).—Yellow-rump Warbler.

This species appeared to be quite abundant at Murphy's in December, 1877. *D. auduboni* was also present, but less numerous than this species, though their similarity at this season rendered their positive identification difficult. It was also found at Marysville in January and February, 1878, but it appeared to be less numerous than *D. auduboni*. In February it and many other small birds wore yellow throats and breasts, which they acquired by feeding among the willows, which had just blossomed.

73790	— ad.	Marysville.....	Feb. —, 1878
73912	— ad.	.... do	Feb. 15, 1878
73913	— ad.	Murphy's.....	Dec. —, 1877
73914	— ad.	.... do	Dec. —, 1877

***35. *Dendroeca auduboni*, (Towns.).—Audubon's Warbler.**

This bird is a very common winter sojourner in the valleys and foothills. It undoubtedly breeds at Big Trees, where I have seen its young scarcely able to fly, though at this time rather rare. It was abundant at Soda Springs and Summit about October 1, 1877. It left Stockton during the first week of May, 1878, in very warm weather, and returned September 18. By October 6 it was common.

It appears to be unable to endure very cold weather, as during a freezing spell at Marysville, in January of this year (1878), it was often found unable to fly. One that I found in the streets in this condition was soon restored by being warmed. Several dead ones were found in the city.

73910	♂ ad.	Murphy's.....	Spring, 1877
73911	♂ ad.	.... do	Spring, 1877
74441	♂ ad.	Stockton.....	Apr. 25, 1878
76375	♂ ad.	*Big Trees.....	July 7, 1878

***36. *Dendroeca occidentalis*, (Towns.).—Yellow-headed Gray Warbler.**

This species was more numerous at Big Trees in July, 1878, than all the other *Dendroeca* combined, and was rather common at Soda Springs in August and September, 1877. In July and August, at Big Trees, it was usually in the evergreens, though it was often, at all hours of the day, in a thin strip of willows in the meadow, having apparently been drawn there as much by the abundance of insects which swarmed in the willows as by the water that flowed through them. There they would allow me to go within a few yards of them, and were slow in learning to fear a gun.

At Big Trees, in May, 1877, this species frequented the deciduous oaks,

and I rarely saw it anywhere else: one was observed on the bare ground, moving deliberately about the end of a decayed log. In its movements it somewhat resembles the Nashville Warbler, and it is not shy, compared with most birds. At Soda Springs it was quite common, keeping generally under forty or fifty feet from the ground, though they sometimes go from the lower to the upper limbs of tall trees by short flights, especially if the sun is shining only on the tree-tops.

I recognized but two at Stockton: these were in the willows on the natural levee of the San Joaquin River.

73030	♂	ad.	*Big Trees	May 20, 1877
73040	♀	ad.	do	May 20, 1877
73020	♂	ad.	do	May 20, 1877
73001	♂	ad.	do	May 20, 1877
73022	—	ad.	Soda Springs	Autumn, 1877
74430	♂	ad.	Stockton	May 9, 1878
74440	♀	ad.	do	May 18, 1878
75563	—	ad.	Big Trees	July 8, 1878
75304	♀	juv.	do	Aug. 24, 1878
75305	—	juv.	do	July 17, 1878
75306	—	juv.	do	July 5, 1878
75307	—	juv.	do	July 25, 1878
			do	July 16, 1878

37. *Dendrocæa townsendi*, (Nutt.).—Townsend's Warbler.

I have not noticed anything peculiar in the habits of this bird. Those I have seen were unsuspecting, and rather slow in their movements, being much like *D. nigrescens* in this respect.

I shot what I supposed was a female of this species near Stockton, June 3, 1878, but did not find it.

The specimens in the collection are all I positively identified at Stockton in the spring of 1878.

73919	—	ad.	Soda Springs	Autumn, 1877
74251	♂	ad.	Stockton	Apr. 29, 1878
74437	♂	ad.	do	Apr. 29, 1878
74438	♀	ad.	do	May 17, 1878

***38. *Dendrocæa nigrescens*, (Town.).—Black-throated Gray Warbler.**

This bird arrived at Murphy's April 15, 1877; at Stockton April 17, 1878. It is a summer resident of Big Trees, though far from abundant there or at any of the places where I have found it. It was more numerous in August than in July, though it seemed to be constantly present during both months. It disappeared from Soda Springs about the middle of September, 1877, or rather it was not seen after my return from the Summit, September 22, and was rare when I left on the 15th.

73915	—	ad.	Soda Springs	Fall, 1877
73916	—	ad.	do	Sept. —, 1877
73917	—	ad.	Murphy's	Apr. 15, 1877
73918	—	ad.	*Big Trees	June —, 1877
75301	—	ad.	do	Aug. —, 1878
75392	—	ad.	do	Aug. —, 1878
76531	♀	ad.	Stockton	May 1, 1878

* 39. *Geothlypis trichas*, (Linn.).—*Maryland Yellow-throat*.

Two or more of these birds were seen at Marysville January 2, 1878, and occasionally thereafter until about the middle of the month, when their favorite cover was flooded by the Yuba River. It was not seen at Stockton during the following March, nor until April 12, soon after which it became abundant in the thickets near water and in the edges of tule swamps near sloughs. It was also found there in December, 1878, but was rare. I have not seen it in the mountains.

It became rare at Stockton after about November 1, 1878.

74263	♂ ad.	*Stockton.....	Apr. 13, 1878
76552	♂ juv.	.....do.....	Dec. 3, 1878

* 40. *Geothlypis macgillivrayi*, (Aud.).—*Macgillivray's Warbler*.

I have not seen this bird below an altitude of about 3,800 feet. It is rather common at Big Trees in the summer months, but was rare at Soda Springs in September. It is seldom, if ever, found out of low shrubbery in the Sierras.

73923	— ad.	*Big Trees.....	June 3, 1877
75310	— juv.	.....do.....	July 22, 1878
75311	— juv.	.....do.....	July 22, 1878

* 41. *Icteria virens*, *β. longicauda*, Lawr.—*Western Yellow-breasted Chat*.

This is a very common summer resident at Stockton, especially in the thickets along the rivers, which it follows into the mountains as high as Murphy's. I first noticed it at Stockton on May 9. It left previous to September 7.

73905	— ad.	*Murphy's.....	June 9, 1877
74434	♂ ad.	*Stockton.....	May 9, 1878
74435	♂ ad.	.....do.....	May 13, 1878

42. *Myiodioides pusillus*, *β. pileolata*, (Pall.).—*Californian Black-capped Green Warbler*.

Arrived at Murphy's April 18, 1877. It was first seen at Stockton May 6, 1878. The last seen during the spring migration was on May 27. Between the dates given it had been abundant in the willows along the San Joaquin River.

At Big Trees it was common from about the middle of May to June 8, 1878, while at Soda Springs it was abundant in fall. I did not find it at Big Trees from July 4 to August 4, though after this it was common.

It is usually found among low bushes in the pine forests, but, like many other birds, frequents deciduous oaks when the leaves are young.

73906	— ad.	Murphy's.....	Apr. —, 1877
73307	— ad.	.....do.....	Apr. —, 1877
74436	♀ ad.	Stockton.....	May 9, 1878
76553	♂ ad.	Murphy's.....	Apr. —, 1877

Family HIRUNDINIDÆ: The SWALLOWS.

*43. *Progne subis*, (Linn.).—*Purple Martin*.

Though common or even abundant in Stockton in the spring of 1878, it was seldom seen in the surrounding country, and then only when birds domiciled in town had wandered a short distance from home.

It arrived at Murphy's in 1877 on March 13; in 1878, at Stockton March 16. It left Murphy's previous to August 27, 1878, and Stockton previous to September 6, 1878. I have not seen it in the pine forests.

73973	♂ ad.	Murphy's	Mar. 15, 1877
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*44. *Petrochelidon lunifrons*, (Say).—*Cliff Swallow*.

A few of these birds were occasionally seen at Big Trees in July. It was rare at Murphy's about September 1, and I did not find it at Stockton on or after September 6. It is abundant at both the latter places during the breeding season.

At Stockton it builds under the eaves of buildings; at Murphy's, in the limestone boulders exposed by mining.

It arrived at Murphy's March 15, 1877; at Stockton March 17, 1878; and at North American Hotel March 12, 1878. On the morning of the 13th, at the latter place, four or five of them occupied a solitary old nest under the gable of the hotel, and forty or fifty of their fellows were flying and twittering around as though trying to dislodge them.

73974	— ad.	*Murphy's	Mar. 15, 1877
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*45. *Hirundo erythrogastra*, *β. hornecrum*, Barton.—*Barn Swallow*.

The Barn Swallow is common at Stockton, Murphy's, and Big Trees in summer, many of them breeding at these places, and was the only Swallow seen at Stockton from September 6 until October 7, when a flock of *Tachycineta bicolor* was observed.

It arrived at Murphy's March 15, 1877, and at North American Hotel, 30 miles east of Stockton, March 12, 1878, while it was first noticed at Stockton, March 20, 1878. It disappeared from the latter place about October 15, 1878.

At Big Trees, Dunbar's, and Moran's Meadows, it frequented barns and other buildings, and did not seem to be generally distributed through the forest.

73977	♂ ad.	*Murphy's	Mar. 15, 1877
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*46. *Tachycineta bicolor*, (Vieill.).—*White-bellied Swallow*.

This bird was seen at Marysville February 1, 1878, and nearly every day thereafter until March 5. During the following March and April it was very abundant at Stockton, flying over the country in all direc-

tions, especially over the tule swamps. In May, when it was less abundant, I noticed two nests in easings over doors of private dwellings.

I have not recognized it at Murphy's or Big Trees. A large scattered flock was seen at Stockton as late as December 5, 1878.

73976	— ad.	*Marysville.....	Feb. —, 1878
76554	♂ ad.	Stockton.....	Oct. 15, 1878
76555	♀ juv.	do.....	Oct. 15, 1878
76556	— ad.	do.....	Oct. 15, 1878
76557	— ad.	do.....	Oct. 15, 1878
76558	♂ ad.	do.....	Oct. 12, 1878

*47. *Tachycineta thalassina*, (Swains.).—*Violet-green Swallow*.

This beautiful bird was first recognized August 7, at Dunbar's Mill, where at least a hundred were in sight. Three days afterward it was seen flying over the meadows at Big Trees, and thereafter nearly every day until August 27, 1878.

They chose as a resting place the top branches of a tall dead pine near the hotel, out of shooting range, and often when flying were so high as to be seen with difficulty; occasionally, however, they mingled with the Barn Swallows near the ground.

75314	♂ juv.	*Dunbar's Mill (alt. 3,800 ft.)....	Aug. 7, 1878
75315	— juv.	do.....	Aug. 7, 1878
76559	♂ ad.	*Big Trees.....	Aug. 10, 1878

48. *Stelgidopteryx serripennis*, (Aud.).—*Rough-winged Bank Swallow*.

This bird arrived at Murphy's March 15, 1877, and remained until May 3, and probably later. They constituted only a fraction of the multitude of Swallows of the place, and were, perhaps, altogether not more than two dozen in number. I have not seen it elsewhere.

73975	— ad.	Murphy's	Mar. 15, 1877
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Family VIREONIDÆ: The VIREOS, or GREENLETS.

*49. *Vireosylvia gilva*, β. *swainsoni*, Baird.—*Western Warbling Vireo*.

This bird I have found at all places where I have collected in summer, but nowhere abundant. It arrived at Murphy's April 26, 1877, and at Stockton May 1, 1878.

It was rare at Murphy's about September 1, and was not seen at Stockton on or after the 7th of that month.

73043	— ad.	*Big Trees	May —, 1877
73901	— ad.	*Murphy's.....	Spring, 1877
73902	— ad.	do.....	Spring, 1877
73903	— ad.	do.....	Spring, 1877
73904	— ad.	do.....	Spring, 1877
74442	♂ ad.	*Stockton.....	May 1, 1878

***50. *Lanivireo solitarius*, *β. cassini*, Baird.*—*Cassin's Vireo*.**

This bird is a common and generally distributed summer resident at Big Trees. I have here found it more abundant than at any other place. I often saw it at Soda Springs in the last of August and the first half of September, and it was quite common in the willows near Marysville in June. At Stockton, it was seen in the willows along the San Joaquin River, about the middle of May only, the entire number being but four or five. In May and June, 1877, at Big Trees, its sweetly expressive song was more attractive to me than the song of any bird of that locality.

About the first of June I found a nest of this species at the Big Trees. The bird remained on it until my eye was within three feet of her head, so that I had a good view of her. I think large numbers breed at the Big Trees and vicinity, as they were very numerous June 8, when I left there.

73011	♂ ad.	*Big Trees	May 10, 1877
73042	♂ ad.	do	May 10, 1877
73537	— ad.	Big Trees	May —, 1877
74445	♂ ad.	*Marysville	June 13, 1878
74446	♂ ad.	do	June 14, 1878
74447	— ad.	Stockton	May 9, 1878

51. *Vireo huttoni*, Cass.—*Hutton's Vireo*.

This bird appears to be very rare in Central California. I found five or six of them in the willows at Marysville, January 20, 1878, and a few days later saw two or three others.

73838	— ad.	Marysville	Jan. 20, 1878
76368	— ad.	Big Trees	Jan. 20, 1878

***52. *Vireo pusillus*, Cones.—*Least Vireo*.**

This very interesting little bird is common in summer in willow thickets at Stockton and Marysville. It arrived at Stockton about April 15, 1878, and left before September 7. It is active, restless, noisy or musical, and does not fail to make its presence known, occasionally giving its tail a side jerk, reminding one, in this respect, of the small Flycatchers. When a nest is being built, the male does all the singing and the female all the work, though the former encourages the latter with its presence as well as song.

A nest taken May 28 had three eggs in it; on the 24th or 25th it had two. I think this pair had a nest destroyed by cattle, though there could not have been more than one or two eggs in it; but those eggs

* Having recently, in conjunction with Mr. Henshaw, carefully studied the Western specimens heretofore called by us and others *L. solitarius*, I have been unavoidably led to adopt Mr. Henshaw's conclusion that *L. solitarius* proper does not occur at all in the West, being replaced in the Pacific Province by *L. cassini*, and in the Middle Province by *L. plumbeus*. My note in the Bulletin of the Nuttall Ornithological Club (vol. iii, No. 2, pp. 65, 66), regarding the asserted occurrence of *solitarius* in California, based upon Mr. Belding's specimens, therefore refers solely to *cassini*. Mr. Henshaw's views, shortly to be published, will explain the matter more fully.—R. R.

should be added to these if my surmises are correct. When the lining of cattle hair had been placed in the nest I supposed the nest complete; the lining of down was added and finished in about an hour. They lingered near the spot long after the nest was taken.

74259	♂ ad.	*Stockton	Apr. —, 1878
74260	♂ ad.	do	Apr. —, 1878
74261	♂ ad.	do	Apr. —, 1878
74262	♂ ad.	do	Apr. —, 1878
74443	♂ ad.	*Marysville	June 12, 1878
74444	♂ ad.	Stockton	May 18, 1878
76532	♀ ad.	Marysville	June 13, 1878
76563	♀ ad.	Stockton	May 11, 1878

Family LANIIDÆ: The SHRIKES.

53. *Lanius borealis*, (Vieill.).—*Great Northern Shrike*.

This Shrike was comparatively common at Marysville in the winter of 1878. It was generally confined to willow thickets.

73015	— ad.	Marysville.....	Jan. 2, 1878
73016	— ad.	do	Jan. 8, 1878
76564	— ad.	do	Feb. 5, 1878

*54. *Collurio ludovicianus*, (Linn.).—*Loggerhead Shrike*.

This Shrike was rather common at Marysville in January and February, and appeared to be the prevailing type of the species at that time and place.

The only Shrike seen at Summit Meadows (fall of 1877) was the juv. in this collection.

NOTE.—The Loggerhead Shrikes collected by Mr. Belding include two forms: a dark-colored style, like true *ludovicianus* of the Gulf States, only, in some specimens, even darker, and one with lighter colors generally, and nearly white upper tail-coverts. None of the latter, however, are the true "*exubitorides* type."—R. R.

73617	— ad.	Marysville.....	Jan. —, 1878
73618	— ad.	do	Jan. —, 1878
73972	— juv.	*Summit Meadows....	Sept. 16, 1877

54 a. *Collurio ludovicianus*, β. *exubitorides*, (Swains.).—*White-rumped Shrike*.

This appears to be the form which is resident at Stockton and Murphy's, and is very common in the intervening country.

In May, 1877, two White-rumped Shrikes were seen at Big Trees.

73971	— ad.	*Murphy's	Dec. —, 1877
76575	♂ ad.	Marysville.....	Feb. 20, 1878
76576	♂ ad.	do	Feb. 23, 1878
76577	— ad.	Stockton.....	Apr. 1, 1878
76578	♂ ad.	do	Apr. 9, 1878
76579	— ad.	do	Nov. 8, 1878

Family AMPELIDÆ: The WAX-WINGS.

55. *Ampelis cedrorum*, (Vieill.).—*Cedar Wax-icing*.

The Cedar-bird is sometimes found in the extensive orchards of Marysville, and may also visit those of Stockton, but I have not seen it at the latter place.

Dr. Davenport, of Stockton, has ten specimens, which he got about June 1 at Camp Seco, Calaveras County.

The people of Camp Seco say that these birds visit that place only when the cherries are ripe, when they come down from the mountains.

76560	♂	ad.	Camp Seco	} Last of May, 1878*
76531	♀	ad.do	

Family TANAGRIDÆ: The TANAGERS.

*56. *Pyrranga ludoviciana*, (Wils.).—*Western Tanager*.

This handsome bird is a common summer resident of Big Trees, where it is generally distributed through the forest. It is quite common at Soda Springs in August and September, less common in the latter than in the former month. About September 1, I noticed several flocks or families of three or four, all of them females or young of the year, at Murphy's. These were in the scattered oaks in the chaparral, feeding on the "wild coffee." It breeds but little below Big Trees.

73982	♂	ad.	Murphy's	Apr. 30, 1877
73983	♂	ad.	* Big Trees	June —, 1877
73984	♂	ad.	.....do	June —, 1877
73985	♀	ad.	.....do	June —, 1877

Family FRINGILLIDÆ: The FINCHES.

57. *Loxia curvirostra*, β. *americana*, Wils.—*American Red Crossbill*.

October 7, 1877, I saw at Summit Meadows what I am tolerably certain was a flock of these birds, and shot one, which I did not get, as it lodged in a tree; do not think I have seen it at any other time.

58. *Hesperiphona vespertina*, (Cooper) — *Evening Grosbeak*.

A flock of these birds was observed at Soda Springs, August 25, 1877, and flocks were occasionally seen in September, though they were not numerous. A few years since I saw a fine adult male at Lake Tahoe previous to August 1. Except upon these occasions, I do not remember having met with it.

73538	♂	ad.	Soda Springs	†Sept. —, 1877
73792	♀	juv.	.....do	Sept. 10, 1877

*59. *Pinicola enucleator*, β. *canadensis*, (Briss.).—*Pine Grosbeak*.

A few of these birds were at Soda Springs in September, 1877. This is the only place where I have seen them.

73539	♂	juv.	Soda Springs	Sept. 22, 1877
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* These specimens, shot from a flock of 16, were collected by Dr. E. C. Davenport.

† The latter part of the month.

* 60. *Carpodacus cassini*, Baird.—*Cassin's Purple Finch*.

This bird probably sometimes breeds at Big Trees, as I found it there from May 3, 1877, to June 8, though it was apparently not there in July or August of 1878. It was abundant at Summit Meadows, August 25 and September 21, 1877, and was often seen at Soda Springs in August and September of the same year. I have not seen it below Big Trees.

73048	♂ ad.	*Big Trees.....	June 8, 1877
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* 61. *Carpodacus purpureus*, β . *californicus*, Baird.—*Californian Purple Finch*.

This is an abundant species at Murphy's in winter, and at Big Trees in summer. I did not see it at Soda Springs nor at Summit Meadows in the fall of 1877. It rarely visits the valleys in winter. A flock of thirty or forty visited Marysville in February, 1878, snow at that time lying unusually low on the mountains.

It left Murphy's about the last of March, 1877; but a few returned April 17, during a slight fall of snow. At Murphy's it frequents chaparral in the pine forest—the evergreens usually—though sometimes it is on the ground feeding on seeds of plants.

73829	— ad.	Marysville	Feb. —, 1878
73927	♂ ad.	Murphy's	Apr. —, 1877
73928	♀ ad.	*Big Trees.....	May —, 1877
73929	♀ ad.	.....do	May —, 1877
73970	♀ ad.	.....do	May —, 1877
73931	♂ ad.	.....do	May —, 1877
74269	♀ ad.	Stockton.....	May 1, 1878
76571	♂ ad.	Big Trees.....	July —, 1878

* 62. *Carpodacus frontalis*, γ . *rhodocolpus*, Caban.—*Californian House Finch*.

This is an abundant constant resident of the valleys and foot-hills of this region. I have seen a large flock in December during very mild weather, nearly a thousand feet above Murphy's, although very few breed above that place.

73932	♂ ad.	*Murphy's.....	Spring, 1877
73933	♂ ad.	.....do	Spring, 1877
73934	♀ ad.	.....do	Spring, 1877
74448	♂ ad.	*Stockton.....	June 8, 1878
76570	♂ ad.	.....do	Oct. 9, 1878

* 63. *Chrysomitris tristis*, (Linn.).—*American Goldfinch*.

The Thistle-bird is a common constant resident of Stockton and Marysville, being quite abundant at the latter place in winter. I have not seen it above Murphy's.

73630	— ad.	Murphy's.....	Jan. —, 1878
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* 64. *Chrysomitris psaltria*, (Say).—*Green-backed Goldfinch*.

This bird is an abundant constant resident of Murphy's. It was constantly present at Big Trees in July and August, though not numerous. It was also seen at Dunbar's and Moran's Meadows (altitude 3,800 feet)

during the same time. In the pine forest I have seen it only in and near cultivated fields.

It seems to be a rather rare winter sojourner of the valleys and an accidental summer visitant to them. A small flock was observed in Stockton May 16, 1878.

73937	♂	ad.	*Murphy's.....	Feb.	6, 1877
73794	♂	ad.	Marysville.....	—	—, 1878
73795	♂	ad.	do.....	—	—, 1878
73796	♂	ad.	do.....	—	—, 1878

* 65. *Chrysomitris lawrencii*, Cass.—*Lawrence's Goldfinch*.

This does not seem to be an abundant species in any part of this region. It was first noticed at Murphy's March 21, 1877, from which time until May 3 flocks of three or four were occasionally seen, but the total number was not more than fifty.

At Marysville, winter of 1877–78, only a dozen or less were seen. I have not seen it above Murphy's, where it was generally found in the chaparral, sometimes in low trees (pines or oaks), occasionally on the ground.

73629	—	ad.	*Marysville.....	Jan.	9, 1878
73935	♂	ad.	*Murphy's.....	Mar.	12, 1877
73936	♂		do.....	Mar.	12, 1877

* 66. *Chrysomitris pinus*, (Wils.).—*Pine Goldfinch*.

A few of these birds were probably breeding at Big Trees in July and August, 1878, and I noticed it at Soda Springs August 28, 1877.

At Murphy's, in December, 1877, I found a flock of a dozen or more familiarly associated with a larger number of *C. psaltria*, feeding on the ground on a rocky hill. They were seen for six or seven consecutive days, or as long as I remained at Murphy's, and appeared to associate in perfect harmony. At Marysville I found, a few weeks later, both species again as familiarly associated. In this case there were but three *C. pinus*, with about twice their number of *C. psaltria*, all sitting on a telegraph wire along the railroad track. They soon alighted on the track near me, four of them forming a group by themselves not covering more than a square foot of ground. Two of this group were *C. pinus*, which I shot, leaving a single survivor of this species among those remaining.

A few days after this, near the same spot, on February 23, I saw a single specimen of *C. pinus* familiarly associated with a flock of *C. tristis*, feeding among the short grass in a pasture about two hundred yards from a willow thicket; perhaps this was the surviving *C. pinus* above mentioned.

I am pretty certain they were breeding there, for many times I saw single birds come to a spring, and depart in the direction from which they came.

73540	—	ad.	.....	—	—, 1877
73793	—	juv.	Marysville.....	—	—, 1878
76366	♀	ad.	*Big Trees.....	Aug.	10, 1878

67. *Passerculus sandwichensis*, *γ. alaudinus*, (Bonap.).—*Western Savannah Sparrow*.

This appears to be the only *Passerculus* found in this region. At Stockton its first and last resorts appear to be the margins of the tule swamps, though nearly all the time while remaining it is distributed throughout the country, in stubble-fields, closely grazed pastures, on fences, often in trees—in fact, everywhere.

It left Stockton about May 1, 1878, and returned September 18. It is a common winter sojourner at Murphy's.

73625	— ad.	Summit of Sierra Nevada, lat. 39°	.....
73626	— ad.	Marysville?	— —, 1878
73627	— ad.	do	— —, 1878
73651	♂ ad.	Murphy's	Apr —, 1877
74264	♂ ad.	Stockton	Apr. 27, 1878
74265	♀ ad.	do	Apr. 27, 1878
73799	— ad.	Marysville	— —, 1878
73800	— ad.	do	— —, 1878
76572	— ad.	Stockton	Sept. 18, 1878
76573	— ad.	do	Sept. 24, 1878

68. *Poocetes gramineus*, *β. confinis*, Baird.—*Western Grass Bunting*.

This appears to be a rare species in Central California. A few individuals were scattered in the pastures at Summit Meadows in September, 1877. I have not recognized it elsewhere.

73542	— ad.	Summit Meadows.....	Sept. —, 1877
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*69. *Chondestes grammica*, (Say).—*Lark Bunting*.

This bird is a common constant resident of the valleys and foot-hills, as high as Murphy's. It was seen in the meadows near Big Trees (altitude 3,800 feet) in July and August, 1878.

73541	— ad.	*Murphy's.....	Feb. —, 1877
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70. *Zonotrichia leucophrys*, (Forst.).—*White-crowned Sparrow*.

While collecting near Summit Meadows in September, 1877, I found a flock of fifteen or twenty of these birds. Something in their movements, perhaps their tameness (for *Z. intermedia* was unaccountably wild), induced me to survey them through a field-glass, which resulted in their identification. I saw them nearly every day of the following week, at nearly the same spot, at times associated with *Z. intermedia*, but usually separated from them.

73543	— ad.	Summit Ice Lakes	Sept. 16, 1877
73928	— ad.	Summit Ice Lakes, 1 mile south of Summit Meadows.	Sept. 16, 1877
73929	— ad.	.....do	Sept. 16, 1877

71. *Zonotrichia intermedia*, Ridgw.—*White-lored White-crowned Sparrow*.

This bird was very abundant at Summit Meadows and Soda Springs in the fall of 1877. I have not seen it at Big Trees in summer.

This appears to be the form of the White-crowned Sparrow which is abundant at Murphy's in winter. It left there about the middle of April in 1877.

73926	— ad.	Murphy's.....	Winter, 1877
73927	— ad.	do.....	Winter, 1877
76585	— ad.	Stockton.....	Apr. 13, 1878
76586	— ad.	do.....	Apr. 26, 1878
76587	— ad.	do.....	Apr. 26, 1878

72. *Zonotrichia coronata*, (Pall.).—Golden-crowned Sparrow.

This bird is an abundant winter sojourner of the valleys and foot-hills. It left Stockton about May 1, 1878, and returned about October 21, soon after which it was abundant. It departed from Murphy's about the 15th of April in 1877.* I have not seen it in the pine forests, though it probably migrates through them.

73950	♂ ad.	Murphy's.....	} Winter, 1877-78
73951	♀ ad.	do.....	

***73. *Junco oregonus*, (Towns.).—Oregon Snowbird.**

This bird is very common at Stockton, Murphy's, and Marysville in winter, and breeds at Big Trees, but not much below that point. It was first noticed at Stockton on the 25th of October in 1877. It was last seen at the latter place April 25, 1878, but during this month it was rare.

73952	♂ ad.	Stockton?.....	Nov. —, 1877 [†]
73953	♀ ad.	Murphy's!.....	Spring, 1877

74. *Amphispiza belli*, (Cass.).—Bell's Sparrow.

The specimen in the contribution of February 11, 1879, is one of a pair of these birds, shot at Murphy's February 1, 1879. They were on a high, steep hill, which was thickly covered with a stunted growth of cedar chaparral, or chemisal, the same hill where I found the specimen of *Peucaea ruficeps*. As soon as I saw them I knew they were strangers to me, and thought they were *A. belli*. This species is a good singer.

75. *Spizella socialis*, *β. arizonæ*, Coues.—Western Chipping Sparrow.

This bird arrived at Murphy's April 11, 1877, soon after this time becoming very common. I first found it feeding in the deciduous oaks on the hillsides, but a few days later it was seen in gardens.

Many breed at Big Trees, where, in 1877, they arrived previous to May 15.

It was unexpectedly rare at Stockton in the spring and summer of 1878. The first seen at this place in the spring of this year was on May 1. None were seen in the fall after September 6.

73544	— ad.	Soda Springs.....	Sept. —, 1877
73628	— ad.	*Calaveras County.....	Spring, 1877
74449	♂ ad.	*Stockton.....	Apr. 30, 1878
73938	— ad.	Calaveras County.....	Spring, 1878
76589	— juv.	Marysville.....	June 15, 1878

* The spring of 1877 was considerably earlier than that of 1878.

76. *Spizella breweri*, Cass.—*Brewer's Sparrow*.

Brewer's Sparrow is undoubtedly abundant in the higher Sierras in summer, though I did not find it at Big Trees in July and August.

I saw but two specimens at Stockton during the spring of 1878.

73939	— ad.	Soda Springs	Sept. —, 1877
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77. *Melospiza fasciata*, γ. *guttata*, (Nutt.).—*Rusty Song Sparrow*.

This was an abundant species at Marysville in the winter and spring of 1878, as late as March 5, and probably later. It was quite generally distributed among the weeds and grass of corn-fields in the bottom-lands, as well as along sloughs, being strikingly different from *M. heermanni* in this respect. It is a winter sojourner of Murphy's, where it is restricted to edges of ponds.

It was first seen at Stockton (in the fall of 1878) on November 14. Here I saw no more than one specimen of this species in the spring (1878), and three or four in the fall of the same year (to November 28). The latter appeared to be migrating, and one of them was found in wheat stubble two or more miles from a slough.

73619	— ad.	Marysville	Jan. —, 1878
73050	♂ ad.	Murphy's	Mar. 20, 1877
76574	— ad.	Marysville	Feb. —, 1878
76575	— ad.	.....do	Winter, 1878

77 a. *Melospiza fasciata*, δ. *fallax*, Baird.—*Rocky Mountain Song Sparrow*.

While collecting at Marysville in winter, I often at first glance mistook for *M. lincolni* what may have been this species. This confusion lasted but two or three weeks, however. Later in the season I tried to duplicate the specimens I had shot, but was unable to do so.

73621	— ad.	Marysville	Jan. —, 1878
76576	— ad.	.....do	Jan. —, 1878
76577	— ad.	.....do	Jan. —, 1878
76578	— ad.	.....do	Feb. —, 1878
76579	— ad.	Stockton	Mar. 22, 1878
76580	— ad.	.....do	Nov. 17, 1878

*77 b. *Melospiza fasciata*, ζ. *heermanni*, Baird.—*Californian Song Sparrow*.

This is an abundant resident of Stockton, and appears to be equally abundant in summer and winter. I have seen two nests in the tule marshes made entirely of flags, while those I found on solid ground were made of grass or weeds, lined with fine grass.

It is the only *Melospiza* found here in summer, and almost the only one in winter.

73620	— ad.	Stockton	July —, 1877
74271	♂ ad.	.....do	Apr. 27, 1878
74272	— ad.	.....do	Mar. 29, 1878
74273	— ad.	.....do	Nov. —, 1877
74274	♂ ad.	.....do	Apr. 20, 1878
73797	— ad.	.....do .....	.....
73798	— ad.	.....do .....	.....
76581	— ad.	.....do	Nov. 17, 1878
76582	— ad.	Murphy's	Dec. 18, 1877
76583	— juv.	Stockton	Sept. 19, 1878

78. *Melospiza lincolni*, (Aud.).—*Lincoln's Sparrow*.

This bird was common at Marysville in the winter and spring of 1878. It frequented the thick dead grass at the edge of sloughs.

The first I had seen the previous fall at Soda Springs was on the 2d of October. It was found at Summit Meadows October 7, 1877. At Big Trees I have seen it in May. At Stockton it has not been seen up to November 28, this year.

This is the only *Melospiza* I have found in the pine forests.

73545	— ad.	Soda Springs.....	Oct. 2, 1877
73622	— ad.	Marysville.....	
73623	— ad.	do	
73624	— ad.	do	
73940	— ad.	Murphy's.....	Mar. 2, 1877

79. *Peucea ruficeps*, (Cass.).—*Rufous-headed Sparrow*.

Only a single specimen of this species has been recognized while making this collection. It was shot while drinking from a spring in a growth of our largest species of fern, on a "cedar-chaparral" hill.

73941	— ad.	Murphy's.....	Dec. 13, 1877
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80. *Passerella iliaca*, *β. townsendi*, (Aud.).—*Townsend's Sparrow*.

A few of these birds were found in the willow thickets at Marysville in the winter of 1877-78. Only one was seen at Stockton after March 6. This was in the edge of the tules, and was evidently migrating.

73942	— ad.	Murphy's?.....	Spring, 1877
73923	— ad.	Marysville.....	Mar. 2, 1878
74266	ad.	Stockton	Apr. 8, 1878
73943	— ad.	Marysville.....	Mar. 2, 1877

80a. *Passerella iliaca*, *γ. schistacea*, Baird.—*State-colored Sparrow*.

77081	— ad.	Murphy's.....	Jan. 4, 1879
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80b. *Passerella iliaca*, *δ. megarhyncha*, Baird.—*Thick-billed Sparrow*.

This bird is a very common summer resident at Big Trees, below which but few are seen in the breeding season. I found it abundant at Soda Springs and Summit Meadows in the fall of 1877. This or the preceding species, perhaps both, is common at Murphy's in winter.

73949	♂ ad.	*Big Trees.....	May —, 1877
73944	— ad.	do	Spring, 1877
73945	— ad.	do	Spring, 1877

***81. *Hedymeles melanocephalus*, (Swains.).—*Black-headed Grosbeak*.**

This bird is a common summer resident of all parts of this region. It arrived at Murphy's about May 1, 1877, and was first seen at Stockton May 6, 1878.

A few were still at Big Trees August 27, but it was not seen in the ten succeeding days at Murphy's, nor did I find it at Stockton September 7 and later.

It was abundant in the willows by the San Joaquin River in May. On the 21st of the latter month I found a nest containing two young and an egg, and on June 3 full-fledged young were seen.

73954	♂ ad.	*Big Trees.....	May 10, 1877
73955	♂ ad.	.....do	May 10, 1877

*82. *Gairaca cœrulea*, (Linn.).—*Blue Grosbeak*.

The males of this species arrived at Stockton May 6, 1878, the first females being seen on the 13th of that month. It was very common in the willows by the San Joaquin River, and was unexpectedly tame. A nest found there May 18 was in the forks of a willow, fourteen or fifteen feet from the ground. It left Stockton before September 7.

74450	♂ ad.	*Stockton.....	May 9, 1878
74451	♂ juv.	.....do	May 23, 1878
74452	♀ ad.	.....do	May 23, 1878
76588	♂ ad.	.....do	May 9, 1878
76589	♀ ad.	.....do	May 14, 1878

*83. *Cyanospiza amœna*, (Say).—*Lazuli Bunting*.

The "Blue Linnet" was rarely seen at Stockton in May and June, 1878, though it is sometimes a common summer resident of this place. It was first seen here May 8, 1878, and departed before September 7. I have found it common at Murphy's in June; it left there previous to August 28.

76391	♂ ad.	*Stockton.....	June 3, 1878
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*84. *Pipilo maculatus*, ♂. *megalonyx*, Baird.—*Long-clawed Towhee*.

This is a common constant resident of the valleys and foot-hills as high as Murphy's, and is a common summer resident of the pine forest up to the summit of the Sierras.

73962	♂ ad.	*Marysville	Feb. —, 1878
76590	— juv.	.....do	June —, 1878

*85. *Pipilo chlorurus*, (Townsend).—*Green-tailed Towhee*.

This bird is a common summer resident at Big Trees, Soda Springs, and Summit Meadows. It does not breed much below Big Trees. A few were seen at Murphy's April 17, 1878, after a slight fall of snow. I have seen but one in the valleys; this was at Marysville on February 12, 1878. It was in a burr-patch near the Yuba River, which was at this time flooding the thickets on its banks, and had perhaps driven the bird from its winter home.

One specimen was seen at Murphy's on the 12th of February: this, also, was in a burr-patch, in the corner of a hog-corral.

73963	— ad.	*Big Trees.....	May 19, 1877
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*86. *Pipilo fuscus*, β . *crissalis*, (Vig.).—*Brown Towhee*.

This is a common or abundant constant resident of the foot-hills, and is found in the valleys in suitable localities. It does not breed much above Murphy's.

73956	— ad.	*Marysville.....	Mar. 2, 1878
73957	— ad.	.....do.....	Mar. 2, 1878
73958	— ad.	.....do.....	Mar. 4, 1878
73959	♂ ad.	.....do.....	Mar. 4, 1878
73960	♂ ad.	.....do.....	Mar. 2, 1878
73961	♂ ad.	.....do.....	Mar. 1, 1878
74275	♂ ad.	North American*	Mar. 12, 1878

Family ICTERIDÆ: The AMERICAN STARLINGS.

*87. *Xanthocephalus icterocephalus*, (Bonap.).—*Yellow-headed Blackbird*.

This is an abundant summer resident of the tule marshes of the valleys: a few may remain in winter, but I do not remember seeing any at that time.

It arrived at Stockton April 6, 1878, and was rather rare until May. But few have been seen since October 15, those mostly young of the year, mixed with Red-wings (*Agelai*). The only one seen after the first of November of this year (1878) was on the 19th instant, when a young bird was noticed in a flock of Red-wings.

Late in the summer and fall it daily visits the grain-fields east of Stockton, returning at evening to the tules.

74276	♂ ad.	*Stockton.....	Apr. 17, 1878
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88. *Agelæus phœniceus*, (Linn.).—*Red-and-buff-shouldered Blackbird*.†

This form of the Red-wing was very abundant at Stockton in the spring of 1878 up to about May 10, when it disappeared during summer-like weather that followed. I have not seen any of the Red-wings in the mountains.

73835	♀ ad.	Marysville.....	Feb. 14, 1878
73836	♀ ad.	.....do.....	Feb. 14, 1878
73837	♀ ad.	.....do.....	Feb. 14, 1878
76594	♂ ad.	Stockton.....	Apr. 4, 1878

*88a. *Agelæus phœniceus*, β . *gubernator*, (Wagl.).—*Red-and-black-shouldered Blackbird*.

This is an abundant constant resident of Stockton. The unmistakable adults mated early, while the immature of this species and *A. phæ-*

* Thirty miles east of Stockton.

† The specimens sent by Mr. Belding are perfectly typical of the species, and not distinguishable from examples from more eastern portions of the country.—R. R.

niceus kept in flocks. Young birds able to fly were observed May 20, 1878.

73830	♂ ad.	Marysville.....	Feb. 14, 1878
73831	♂ ad.	.....do.....	Feb. 14, 1878
73832	♂ ad.	.....do.....	Feb. 14, 1878
73833	♂ ad.	.....do.....	Feb. 14, 1878
73834	♂ ad.	.....do.....	Feb. 14, 1878
74277	♂ ad.	*Stockton.....	Mar. 29, 1878
74278	♂ ad.	.....do.....	Apr. 17, 1878
76592	♂ ad.	.....do.....	Apr. 4, 1878
76593	♂ ad.	.....do.....	Spring, 1878

* 89. *Agelæus tricolor*, (Nutt.).—*Red-and-white-shouldered Blackbird*.

The *A. tricolor* appeared to avoid Stockton in the spring of 1878. I recognized but four during the spring and summer. Two of these were seen March 22 and two on April 5.

73987	♂ ad.	Stockton.....	Spring, 1875
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* 90. *Sturnella neglecta*, Aud.—*Western Meadow Lark*.

This bird is an abundant constant resident of the valleys and foot-hills as high as Murphy's. It is also a summer resident of some of the more suitable localities of the Upper Sierras.

73989	♂ ad.	*Murphy's.....	Spring, 1877
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* 91. *Scolecophagus cyanocephalus*, (Wagl.).—*Brewer's Blackbird*.

This is an abundant constant resident at Stockton, probably equaling, possibly exceeding, in numbers the Red-wings, especially in autumn. It is also a constant resident at Murphy's, and in summer is found in suitable localities in the pine forests. It was very common at Summit Meadows in September, 1877. At Stockton many breed in closely-trimmed ornamental evergreens.

73988	♂ ad.	*Murphy's.....	Spring, 1877
76595	♂ ad.	Stockton.....	Sept. 30, 1878
76596	♀ ad.	.....do.....	Sept. 30, 1878

* 92. *Icterus bullocki*, (Swains.).—*Bullock's Oriole*.

This Oriole is a common summer resident of the valleys and foot-hills. An adult male was shot at Big Trees July 13, 1878. This is the only one I have seen in the pine forests.

The males arrived at Murphy's March 24, 1877; at Stockton April 1, 1878. On April 6, 1878, the first female was seen. The species left Murphy's previous to August 27 and Stockton previous to September 7.

A nest found May 11 in a willow, eight feet from the ground, contained two eggs.

73986	♂ ad.	*Murphy's.....	Mar. 24, 1877
74453	♂ ad.	*Stockton.....	Apr. 1, 1878

Family CORVIDÆ: The RAVENS, CROWS, and JAYS.

* 93. *Corvus americanus*, (Aud.).—*Common Crow*.

[Mr. Belding states that this species (which, however, he mistakes for *C. caurinus*) is "an abundant resident of Central California." The specimen he sends is true *americanus*, and not *C. caurinus*. The Crows which the writer observed in the Sacramento Valley, in June, 1867, were certainly *C. americanus*, their notes and habits in no wise differing from those of the Eastern birds of this species. It is probable that *C. caurinus* is, like the Eastern *C. ossifragus*, a strictly littoral species, never found away from tide-water.—R. R.]

76397	— ad	Stockton.....	Nov. —, 1878
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* 94. *Picicorvus columbianus*, (Wils.).—*Clarke's Nutcracker*.

This species is very common at Soda Springs and Summit Meadows in the fall, and is said to be a rare winter visitor to the Big Trees.

* 95. *Pica nuttalli*, Aud.—*Yellow-billed Magpie*.

This Magpie is a common constant resident of Marysville, and, during some years, at Stockton also, but I did not see it at the latter place from April 1, 1878, to October 18 of the same year, though it was seen in June at many places on the route between Stockton and Marysville. On December 22, 1877, I saw it at Salt Spring Valley, between Milton and Murphy's (altitude about 1,200 feet). It probably occasionally breeds at Murphy's.*

73818	♂ ad	Marysville.....	Feb. —, 1878
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* 96. *Cyanocitta stelleri*, *β. frontalis*, Ridgw.—*Californian Mountain Jay*.

This Jay is very common in the pine forests in summer, and is a winter sojourner of the chaparral belt, especially that part nearest the pine forest. A few breed down to an altitude of 3,000 feet or a little less. It is an occasional winter visitant to the live-oak groves in the Sacramento Valley, ten or twelve miles north of Marysville.

73890	— ad	Murphy's.....	Apr. 12, 1877
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* 97. *Aphelocoma californica*, (Vig.).—*Californian Valley Jay*.

This is a common constant resident of the valleys and foot-hills, and appears to be quite numerous in the pine forests in summer, as high as Big Trees, where I found it in July and August, 1878; also at Gardiner's Meadow, three miles east of Big Trees, the altitude the same as that of Big Trees; and at Dunbar's and Moran's Meadows (altitude 3,800 feet). In the pine forests above Murphy's it was confined to the thickets in

* I lived at Murphy's from the spring of 1857 to 1860, but in summer only. Think I have seen it there formerly, but not recently.

and around meadows. It is more abundant in the valleys in winter than in summer.

Once, having shot a Quail which fluttered violently, one of these birds pounced upon it and began to tear it.

73829	— ad.	*Marysville.....	Feb. —, 1878
76598	— juv.	Big Trees.....	July —, 1878

98. *Perisoreus canadensis* (γ. *obscurus*, Ridgw. ?).*—Oregon Gray Jay.

On October 7, I saw at Summit Meadows what I supposed to be this bird. It is said to breed in the high parks of Castle Peak, a few miles north of the Summit Meadows.

Family ALAUDIDÆ: The TRUE LARKS.

99. *Eremophila alpestris*, (Forst.).—Horned Lark.

The Horned Lark was common at Marysville in the winter of 1877-78, in flocks of not more than twenty-five or thirty, generally less. A small flock was seen at Summit Meadows in the fall of 1877.

73788	♂ ad.	Marysville.....	Feb. —, 1878
73789	♂ ad.	.....do.....	Feb. —, 1878
73970	— ad.	Summit Meadows	Oct. 6, 1877

*99 a. *Eremophila alpestris*, β. *chrysolæma*, (Wagl.).—Southern Horned Lark.

This form of the Horned Lark is an abundant resident at Marysville, in summer frequenting the dry plains, especially those near the low, rolling hills on the eastern margin of the valley, where the growth of vegetation is meagre. In December, 1878, it was abundant on the low, rolling hills east of Stockton, on the road to Copperopolis.

The difference in appearance between a flock of these while on a field of short, green grass in bright sunshine, and that of a flock of the northern variety is so great that any collector could not fail to observe it.

73787	♂ ad.	*Marysville.....	Feb. —, 1878
73964	— ad.	*Calaveras County (at Milton) ..	Spring, 1877
73965	— ad.	.....do.....	Spring, 1877
73966	♂ ad.	Marysville.....	Feb. —, 1878
73967	♂ ad.	.....do.....	Feb. —, 1878
73968	♂ ad.	.....do.....	Feb. —, 1878
73969	♂ ad.	.....do.....	Feb. —, 1878
76599	♂ ad.	.....do.....	Feb. —, 1878
76600	♀ ad.	.....do.....	Feb. —, 1878

*It is somewhat uncertain whether the birds alluded to above are of the Oregon form (*obscurus*) or the Rocky Mountain race (β. *capitalis*, Baird). Judging from analogy, however, in the cases of *Cyanocitta* and *Aphelocoma*, they should be the former. a probability strengthened by the fact that Mr. Henshaw obtained specimens of *obscurus* at Camp Bidwell, in the northern Sierra Nevada.—R. R.

†The fine series of this very strongly marked race, sent by Mr. Belding, shows unusual uniformity of characters for birds of this genus, there being little variation among individuals. The light pinkish gray tints of the more northern and eastern forms (*alpestris* and *leucolæma*) are replaced by a very deep cinnamon color, or rusty brown, while the size is decidedly smaller. They agree quite closely with Mexican examples, as described in *History of North American Birds* (vol. ii, p. 144).—R. R.

Family TYRANNIDÆ: The TYRANT FLYCATCHERS.

*100. *Tyrannus verticalis*, (Say).—*Western Kingbird*.

This bird arrived at Murphy's April 12, 1877, and at Stockton March 20, 1878. It is an abundant summer resident at Stockton, Murphy's, and Marysville. Two were seen at Big Trees in May, 1877, and one at the same place August 10, 1878. It was very rare at Murphy's August 27, 1878, and had left there before September 7.

73991	— ad.	*Murphy's.....	Apr. 12, 1877
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*101. *Myiarchus cinerascens*, Lawr.—*Ash-throated Flycatcher*.

The Ash-throated Flycatcher was first seen at Murphy's April 17, 1877; at Stockton April 27, 1878, where it was abundant in the thickets by the San Joaquin River during the first half of May. A few were seen there afterward, and these may have had nests, although I have generally found them during the breeding season in oak groves.

It is quite a common summer resident at Stockton and Murphy's, and a young one was shot at Big Trees August 10, 1878. It was very rare at Murphy's August 27, 1878. It was not seen at Stockton on or after September 7.

73546	♂ ad.	*Murphy's.....	Apr. 17, 1877
73992	— ad.	.....do.....	Apr. 17, 1877
74281	♂ ad.	*Stockton.....	Apr. 27, 1878

*102. *Sayornis nigricans*, (Swains.).—*Black Pewee*.

This bird is a common constant resident of Stockton, Murphy's, and Marysville. It frequented the willows by the streams in the meadows at and near Big Trees in July and August, 1878. Since it was oftener seen in August than in July, it may have made a short vertical migration from lower down after the breeding season.

73611	— juv.	*Stockton.....	*July —, 1877
74000	— ad.	*Murphy's.....	Winter, 1877
74279	♂ ad.	Stockton.....	Apr. 9, 1878
74280	♂ ad.	.....do.....	Apr. 1, 1878

103. *Sayornis sayus*, Bonap.—*Say's Pewee*.

This Pewee is a winter sojourner at Stockton, Murphy's, and Marysville, where, however, it is rarely, if ever, common. It was first noticed at Stockton in the fall of 1878, on October 17.

73999	— ad.	Stockton.....	Nov. —, 1877
76301	— ad.	.....do.....	Oct. 17, 1878

*104. *Contopus borealis*, (Swains.).—*Olive-sided Flycatcher*.

This is a very common and generally distributed summer resident at Big Trees. I shot one July 7, 1878, which had materials for a nest in

*Albinescent

its bill. About a week later I found a young bird which could scarcely fly, and which, on being caught, proved very pugnacious. Its song is a loud prolonged "three deer," the last syllable being much shorter than the first. Both are occasionally prefaced with a short note in a lower key. Its other very common, not unmusical notes, I once copied with the syllables "chu-chu-chu"; again, "pu-pu-pu"; again, "pip-pip", the notes apparently varying with the individual. These notes follow each other rapidly, sometimes consisting of groups of two, usually of three, occasionally of four, a call almost invariably ending with groups of the same number as that with which it began. It is usually uttered from the top of a dead tree, often two hundred feet from the ground. It appears to prefer the tops of the tallest dead trees as a foraging centre. They utter notes while chasing one another, which I once described as resembling those of Flickers, but I am not now satisfied with that description.

73993	— ad.	*Big Trees.....	May 25, 1877
75316	♀ ad.	.....do	July 7, 1878
75317	♂ ad.	.....do	July 16, 1878

*105. *Contopus richardsoni*, (Swains.).—*Western Wood Pewee*.

This species was first noticed at Stockton during the spring of 1878, on May 9, soon after which it became common in all suitable localities. It is common in the pine forests in summer. It was rare at Murphy's August 27, and was not seen at Stockton in September or later.

73547	.....	*Murphy's.....	— —, 1877
73994	.....	*Big Trees.....	May 25, 1877
73995	.....	.....do	Spring, 1877
74454	.....	*Stockton.....	May 15, 1878
76602	.....	Murphy's.....	Sept. —, 1878

*106. *Empidonax difficilis*, Baird.*—*Western Yellow-bellied Flycatcher*.

Only two of these birds were recognized at Stockton in the spring of 1878, the first being noticed on May 1. Two or three were seen at Big Trees in July and August. These were in willows at the head of ravines, near springs. Those seen at Stockton were in open oak groves.

75318	♂ ad.	Big Trees.....	July 27, 1878
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*107. *Empidonax pusillus*, (Swains.).—*Little Flycatcher*.

This is a common summer resident at Stockton and Marysville. It seems invariably confined to willow thickets, and to occur wherever they do, whether in valleys or mountains.

*In my report on the Ornithology of the U. S. Geological Exploration of the 40th Parallel (Clarence King), p. 544, I considered this bird as specifically distinct from *E. flaviventris*, chiefly on account of supposed great differences in the location and character of the nest and eggs. Facts subsequently brought to light, however, by Messrs. H. A. Purdie and S. D. Osborne (see *Bull. Nutt. Orn. Club*, Oct. 1878, pp. 166, 187), show that the two do not differ in these particulars. Notwithstanding this, the difference between the two forms in coloration and proportions is so marked that there should never be any difficulty in easily distinguishing them.—R. R.

†That is, not darkly shaded, the trees scattering, and with no undergrowth.

It was first noticed at Stockton April 30, 1878, and was not seen here in September or October.

73044	♂	ad.	*Stockton	July —, 1877
73936	—	ad.	do	July —, 1877
74455	♂	ad.	do	May 11, 1878
75321	—	ad.	*Big Trees	Aug. 3, 1878

***108. Empidonax obscurus**, (Swains.).—*Wright's Flycatcher*.

This bird was first seen at Murphy's on April 28, 1877, at which time it was rather common. It perched on the lower dead limbs of small trees which grew on hillsides, from which it would make short flights over the valley below, and return to the same perch. I have not recognized it in the valleys.

75319	♂	ad.	*Big Trees	July 8, 1878
73047	♂	ad.	Murphy's	Apr. 28, 1877
73997	—	ad.	do	
75320	—	juv.	Big Trees	July —, 1878

***109. Empidonax hammondi**, Xantus.—*Hammond's Flycatcher*.

This small Flycatcher is a common summer resident of the pine forests, out of which I have not seen it except when migrating. It arrived at Murphy's April 25, 1877, and at Stockton May 9, 1878.

At the latter place it was rare, and confined to the willow thickets on the river-banks.

73045	♂	ad.	Murphy's	Apr. —, 1877
73046	♂	ad.	do	Apr. 28, 1877
73998	—	ad.	Soda Springs	Sept. —, 1877
76603	♂	ad.	Stockton	May 9, 1878

Family TROCHILIDÆ: The HUMMING-BIRDS.

***110. Stellula calliope**, Gould.—*Calliope Humming-bird*.

While making this collection I have seen but two of these birds in spring plumage: these were at Murphy's, in April. It was very rare at Big Trees in July and August. I have never seen it in the valleys.

At Soda Springs, in the fall of 1877, Humming-birds were abundant. I shot a number of them. They were young or moulting, and so did not preserve them. They were principally *Selasphorus rufus*, but perhaps the present species was among them.

74005	♂	ad.	Murphy's	Apr. —, 1877
75325	♀	ad.	Big Trees	Aug. 1, 1878

***111. Trochilus alexandri**, Bourc. & Muls.—*Black-chinned Humming-bird*.

This bird was common in the open parts of the willow thickets at Marysville in June, 1878. It was not observed at Stockton from March 6 to June 8, though not more than five Humming-birds were seen during that time, and five or six are all I have seen at Stockton during the pres-

ent season. I do not know whether this is usually the case or not, as this was my first spring and summer collecting here. Nearly every one seems to know the Anna Humming-bird, but I did not see it here last spring.

T. alexandri must have been rare at Big Trees, as I did not see an adult male in spring plumage, and was not certain of the species to which the one which I shot there belonged.

74462	♂ ad.	*Marysville.....	June 21, 1878
74463	— juv.	.....do.....	June 22, 1878
75323	♂ juv.	Moran's Meadow.....	July 24, 1878
75324	— juv.	Big Trees.....	July —, 1878

*112. *Calypte annæ*, (Less.).—*Anna Humming-bird*.

This Hummer is abundant at Murphy's and in the hills below during a large portion of the year. It was seen at Copperopolis* on the 12th of December of the present year. There were no wild flowers, excepting those of the "Manzanita." Specimens shot there were very fat, and had been feeding on a sweet gummy substance exuding from perforations made by Woodpeckers in the bark of an evergreen oak.

74001	♂ ad.	*Murphy's.....	Jan. 30, 1877
74002	♂ ad.	.....do.....	Spring, 1877
74003	♂ ad.	.....do.....	Spring, 1877
74004	♀ ad.	.....do.....	Spring, 1877
75322	♀ ad.	Big Trees.....	Aug. 1, 1878

*113. *Selasphorus rufus*, (Gmel.).—*Rufous-backed Humming-bird*.

This species is common at Big Trees in summer, and abundant at Soda Springs in the fall. I have seen a few at Stockton and Murphy's in spring.

74267	♀ ad.	Stockton.....	Apr. 30, 1878
75326	— juv.	Big Trees.....	July 25, 1878

Family CAPRIMULGIDÆ: The GOATSUCKERS.

114. "*Antrostomus*" *nuttalli*, (Aud.).—*Poor-will*.

The specimen in the collection is the only one I have seen in two years.

73978	— ad.	Stockton.....	July —, 1877
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*115. *Chordeiles popetue* (Vicill.) (*β. henryi*, Cass. ?).—*Night Hawk*.

The Night Hawk is abundant at Soda Springs in July and August and during the first part of September.

I suppose a few occur at Big Trees in July or August, as (in 1878) I heard of "Whippoorwills" there which roosted on trees, but I could not find any.

* Copperopolis is in the pine belt, about 1,200 feet above sea-level.

Family PICIDÆ: The WOODPECKERS.

*116. *Picus villosus*, *ε. harrisi*, Aud.—*Harris's Woodpecker*.

This is a common summer resident of Big Trees. It is also numerous at Soda Springs and Summit Meadows in the fall. I have seen it at Murphy's in winter, but not in summer. It breeds but little below Big Trees. I have not seen it in summer below an altitude of 3,500 feet, nor have I ever seen it at Stockton or Marysville.

73856	♂	ad.	.....	*1877
73857	♂	ad.	.....	1877
73858	♂	ad.	.....	1877
73859	♀	ad.	.....	1877

117. *Picus pubescens*, Linn.—*Downy Woodpecker*.

A single individual of this species was shot at Marysville, as below recorded.

73606	♂	ad.	Marysville.....	Dec. 27, 1877
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*117 a. *Picus pubescens*, *β. gairdneri*, Aud.—*Gairdner's Woodpecker*.

This bird was abundant in the willows at Marysville in the winter of 1877-78, and was often seen at the same place the following June.

It appears to be generally distributed in the pine forest, but I have not found it abundant nor even scarcely common.

73607	♀	ad.	*Marysville..... ⁹	Dec. 27, 1877
73806	ad.	.....	do	Feb. —, 1878
73807	♂	ad.	.....do	Feb. —, 1878
73808	ad.	.....	do	Feb. —, 1878
73809	♂	ad.	.....do	Feb. —, 1878
73860	ad.	.....	Murphy's.....	Feb. —, 1877
73861	ad.	.....	.....do	Feb. —, 1877
74259	ad.	.....	Marysville.....	June 14, 1878
76360	—	juv.	*Big Trees.....	July 26, 1878

*118. *Picus nuttalli*, Gamb.—*Nuttall's Woodpecker*.

This is a common constant resident at Stockton, Murphy's, and Marysville. I have not recognized it in the pine forests. One seen at Marysville in June was red from bill to nape. It was too near to shoot.† The iris of all I shot at Marysville was dark blood-red.

73033	♀	ad.	*Murphy's	Apr. —, 1877
73801	ad.	.....	Marysville.....	Feb. —, 1878
73802	ad.	.....	do	Feb. —, 1878
73803	ad.	.....	do	Feb. —, 1878
73804	ad.	.....	do	Feb. —, 1878
73805	ad.	.....	do	Feb. —, 1878
73855	ad.	.....	Murphy's.....	Apr. 20, 1877
76605	ad.	.....	Stockton	Nov. 13, 1878

*119. *Picus albolarvatus*, (Cass.).—*White-headed Woodpecker*.

I have found this bird abundant at Big Trees in summer, and common at Soda Springs and Summit Meadows in fall. In December, 1877,

* Mr. Belding writes in regard to these specimens that one was from Big Trees, one from Murphy's, and two from Summit Meadows.—R. R.

† Probably a young male.—R. R.

one was seen near Murphy's at an elevation of about 3,000 feet, the lowest point at which I have observed it.

It breeds in low stumps, fallen and standing trees, rarely more than fifteen feet from the ground, often but three or four. When chasing one another around the trunks or through the branches of trees, their cry is "wick-wick-wick-wick-wick-wick," syllable rapidly following syllable. However, they do not often indulge in play.

75854	♂ ad.	*Big Trees.....	May —, 1877
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120. *Picoides arcticus*, (Swains.).—Black-backed Three-toed Woodpecker.

In the fall of 1877 I shot one of these birds at Soda Springs and one at Summit Meadows. It was very rare at both places. I have not seen it at Big Trees, nor below that altitude.

75862	♀ ad.	Soda Springs.....	Sept. —, 1877
76706	♀ ad.	Summit Meadows.....	Sept. —, 1877

***121. *Sphyrapicus varius*, β . *ruber*, (Gmel.).—Red-breasted Woodpecker.**

Next to *P. albolarvatus*, this is the most common Woodpecker at Big Trees in summer. I also found it common at Soda Springs in fall, and shot two young birds, which were probably hatched there. It is a rather rare winter sojourner at Marysville and Murphy's.

73851	— ad.	Murphy's.....	} Winter and spring, 1877
73852	— ad.	.....do.....	
73853	— ad.	.....do.....	
76607	— juv.	Big Trees.....	July —, 1878

122. *Sphyrapicus thyroideus*, (Cass.).—Black-breasted Woodpecker.

I saw five or six of these birds at Soda Springs in the fall of 1877, and in December of the same year shot one at Murphy's (altitude about 2,400 feet). These are all I have recognized.

73849	♀ ad.	Murphy's.....	Dec. —, 1877
73850	♀ ad.	Soda Springs.....	Sept. —, 1877
73548	♂ ad.	.....do.....	Sept. —, 1877
73549	♀	.....do.....	Sept. —, 1877

***123. *Hylotomus pileatus*, (Linn.).—Pileated Woodpecker.**

This bird is often seen at Big Trees in summer, and some years ago I observed that it was quite common in the Coast Range of mountains on the North Fork of Eel River in Mendocino County. It does not appear to be abundant in any part of Central California.

73848	♀ ad.	*Big Trees.....	Spring, 1877
76359	♂ ad.	.....do.....	July 28, 1878

*124. *Melanerpes torquatus*, (Wils.).—*Lewis's Woodpecker*.

This is a common resident of Stockton and Marysville, and appears to be more numerous in the valleys than in the foot-hills or the Upper Sierras, where, however, it occasionally occurs.

Those I have seen in the pine forests were apparently traveling in straggling scattered flocks. I have not found it at Big Trees in breeding season.

73823	—	ad.	*Marysville.....	Feb. —, 1878
73824	—	ad.	.....do.....	Feb. —, 1878
74282	♂	ad.	*Stockton.....	Mar. 27, 1878
74283	♀	ad.	.....do.....	Apr. 9, 1878

*125. *Melanerpes formicivorus*, (Swains.).—*Californian Woodpecker*.

This is an abundant constant resident of the valleys and foot-hills. I shot one at Big Trees in August, but considered it a straggler.

73825	♂	ad.	*Marysville.....	*Feb. —, 1878
73826	—	ad.	.....do.....	Feb. —, 1878
73827	♂	ad.	.....do.....	Feb. —, 1878
73828	♂	ad.	.....do.....	Feb. —, 1878
73865	♂	ad.	*Murphy's.....	Spring, 1877
76708	♂	ad.	Marysville.....	Winter, 1878

*126. *Colaptes auratus*, *β. mexicanus*, Swains.—*Red-shafted Flicker*.

This is a common constant resident at Stockton, Murphy's, and Marysville, and is a common summer resident of the pine forests.

73601	♂	ad.	*Marysville.....	Dec. 29, 1877
73605	♂	ad.	.....do.....	Dec. 29, 1877
73810	—	ad.	.....do.....	Winter, 77-78
73820	♂	ad.	.....do.....	Feb. —, 1878
73821	♂	ad.	.....do.....	Feb. —, 1878
73822	♂	ad.	.....do.....	Feb. —, 1878
76609	♀	ad.	Stockton.....	Oct. 3, 1878
76610	♀	juv.	Marysville.....	June —, 1878

*126 a. *Colaptes auratus*, *γ. hybridus*, Baird.—“*Hybrid*” *Flicker*.

The plumage of probably half the numerous Flickers which I shot in January and February, 1878, at Marysville was variously intermediate between that typical of the supposed species *C. mexicanus* and *C. auratus*. Those with uniformly golden shafts were unquestionably the rarest of all. Quite a large number of those I had the good fortune to shoot in January had well-developed red nuchal crescents, and the iris was usually dark blood-red.† No trace of black in the cheek-patches was observed in any of them. At Stockton, in March, 1878, I found it somewhat difficult to find a specimen in which the shafts were all yellow, or in which this color even predominated, though the number of specimens taken here at different times satisfied me that “hybrids” were not

* “Iris milky white, tinged with pale pink or carmine; feet pale pea-green.”—Note to one of the above specimens.—R. R.

† This is frequently the color of the iris in very adult specimens of both *mexicanus* and *auratus*, and is, perhaps, a mark of high maturity, possibly a mere individual peculiarity.—R. R.

uncommon residents. It occurred to me while in Marysville, in June, that by shooting more young from a family, some light might be thrown on the subject,* but in no case did I succeed in getting more than one.

[This series is one of great interest, as showing that the so-called "Hybrid Flicker" is by no means confined to the region where the ranges of the true *auratus* and *mexicanus* join or blend. Dr. Cooper records (Orn. Cal. i, p. 412, note) "two or more specimens" from near Oakland, Cal.; and the writer observed, on several occasions, in the extreme western portion of Nevada, Flickers having pure yellow shafts, and so much resembling, at the distance from which they were observed, the *C. auratus* or *C. chrysoides*, that they were doubtfully referred to one or the other of these species (see Orn. 40th Parallel, p. 557). This probable error was based upon geographical considerations, the chances against their being the *C. hybridus* being the assumed scarcity of this species west of the Missouri region, taken together with the known tendency of strictly Eastern species to straggle westward, even to the very frontiers of California (e. g., *Tyrannus carolinensis* and *Ectopistes migratoria* in western Nevada), and the possible northward extension of the range of *C. chrysoides* to the district indicated.

None of the specimens collected by Mr. Belding have black moustaches, and he says that he has seen none thus marked. He considers the occurrence of the scarlet occipital crescent quite frequent, however, as is also the admixture of yellow feathers in the wings and tail, or the entire replacement of the red of the one species and the pure yellow of the other by a tint more or less intermediate between the two. One specimen corresponds very nearly to *C. "ayresi"* of Audubon, having red moustaches, gray throat, and yellow shafts; the latter have a decided orange cast, however, while there is merely a trace of the occipital crescent. The most interesting specimen of all is one of which, unfortunately, only the wings and tail were sent. In this, the remiges and rectrices are deep red as in typical *mexicanus*, with the exception of the middle pair of the latter and one secondary (the corresponding one) of each wing, which are pure gamboge-yellow, without a trace of orange, the contrast being thus very striking. Another specimen, of which only the tail was sent, is similar, except that the middle tail-feathers are pale pinkish instead of yellow.

It may be remarked, as a noteworthy fact, that in all the specimens sent by Mr. Belding, the pattern of coloration is perfectly symmetrical, so far as opposite sides of the bird are concerned; that is, when there are one or more feathers of "abnormal" color in one wing or in one-half of the tail, these are represented by corresponding ones on the opposite side. How far this rule will hold good when other specimens are examined I do not know, but my opinion, based upon my recollection of

* The securing of the *entire family*—that is, both the parents and their young—whenver the occasion offers, is a much needed aid to the determination of the real character of these so-called "hybrid" Flickers.—R. R.

many other specimens, is that it will be found of nearly universal application.*—R. R.]

73602	♂	ad.	Marysville.....	Dec. 29, —	Tail only. Do.
73603	—	ad.	.....do.....	Dec. 29, —
73604	—	ad.	.....do.....	Dec. 29, —
73811	—	ad.	.....do.....	.....
73819	♂	ad.do.....	Feb. —, 1878	Wings and tail.
73863	♂	ad.	.....do.....	Mar. 1, 1877
73864	♂	ad.	.....do.....	Mar. 1, 1877
74458	♂	ad.	*Stockton.....	June 8, 1878	
76611	♂	ad.	.....?	May 18, 1878

Family ALCEDINIDÆ: The KINGFISHERS.

* 127. *Ceryle alcyon*, (Linn.).—*Belted Kingfisher*.

The Kingfisher is a common resident at Stockton. It is also occasionally seen at Murphy's, at all seasons. It is rarely found in the mountains of this region.

74284	♀	ad.	*Stockton.....	Apr. 15, 1878
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Family CUCULIDÆ: The CUCKOOS.

* 128. *Geococcyx californianus*, (Less.).—*Road Runner*; *Chaparral Cock*.

The Road Runner is a rare resident of the chaparral only. Many years ago I saw one between Vallecita and Angel's (altitude about 2,000 feet), and I have seen a few others in Calaveras County, below this elevation, three in Marysville buttes, one in the hills east of Marysville—in all about a dozen—in twenty or more years, though I have hunted a great deal in the foot-hills—lived at Murphy's and San Andreas from the spring of 1857 to October 1862.

* 129. *Coccyzus americanus*, (Linn.).—*Yellow-billed Cuckoo*.

The Yellow-billed Cuckoo was common in the willow and poplar thickets at Marysville in June, 1878, but whether generally distributed in the extensive thickets of like character so abundant along the rivers of Northern California, I am unable to say. I heard one at Murphy's about September 1, 1878.

74457	♀	ad.	*Marysville.....	June 22, 1878
76604	♂	ad.	.....do.....	June 13, 1878

* Mr. Henshaw informs me that he examined a specimen taken at San Francisco, which had all the rectrices of one side of the tail red, those of the other half being yellow!—R. R.

Family STRIGIDÆ: The OWLS.*

*130. *Strix flammea*, *β. pratincola*, Bonap.—*American Barn Owl*.

The Barn Owl is a common resident of the valleys, especially in the willow thickets near Stockton. I have not seen it in the mountains.

76612	— ad.	*Stockton	Wing only.
76613	— ad.	.....do	Do.

131. *Asio accipitrinus*, (Pall.).—*Short-eared Owl*.

This Owl is common at Stockton and Marysville in winter. It left the former place about the first of April of the present year, and reappeared on or before September 30 following.

74298	— ad.	Summit Meadow	Sept. 16, 1877
74299	♂ ad.	Stockton	Mar. 30, 1878

132. *Asio wilsonianus*, (Less.).—*Long-eared Owl*.

I have seen this Owl at Marysville in former years, but do not think I have seen it anywhere within the last two years.†

*133. *Bubo virginianus*, *δ. subarcticus*, Hoy.—*Western Great Horned Owl*.

This Owl is very common at Big Trees in summer and is occasionally seen in the valleys in winter. I do not remember seeing it in the valley during summer, nor did I see or hear it at Soda Springs or Summit Meadows in the fall of 1877, though I was informed that it is sometimes found there. There is one mounted at the Big Trees, which I shot there several years ago. It is often seen at Marysville, especially in winter.

*134. *Scops asio*, (L.).—*Little Mottled Owl*; *Screech Owl*.

This Owl is quite abundant at Stockton. I have seen it among the foot-hills, but not in the pine forests. [These specimens, like all others from California and the Western Province in general, so far as known, are in the gray plumage.—R. R.]

76614	♀ ad.	Stockton	Nov. 12, 1878
76615	♂ ad.	.....do	Nov. 13, 1878
76616	— ad.	.....do	†Oct. —, 1878

* I have never shot a bird of the genus *Syrnium* in California, though on October 25, 1878, I saw in an oak grove two large ash-colored Owls, which may have belonged to a species of this genus. They were nearly as large as the Great Horned Owl, and appeared to see well in the bright sunlight. No ear-tufts were noticed. At Big Trees I tried several nights to shoot a large Owl, which may have been a *Syrnium*, but did not succeed. One evening it flew, at a sharp angle, to the top of a dead pine-tree, out of the reach of shot, where it sat silently for about half an hour [NOTE.—In the absence of any other known species to which the above description will apply, and allowing for the circumstances under which the birds were seen, it is quite possible that they were the grayish variety of *Bubo virginianus*.—R. R.]

† While attached to the U. S. Geological Exploration of the 40th Parallel, I found this Owl very abundant in the willow thickets at Sacramento City, in June, 1867.—R. R.

‡ Found dead.

*135. *Speotyto cunicularia*, γ . *hypogæa*, (Bonap.).—*North American Burrowing Owl*.

This is an abundant resident species of the valleys, out of which I have never seen it.

76617	— ad.	Stockton.....	Nov.—, 1878
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136. *Glaucidium gnoma*, (Wagl.).—*Californian Pigmy Owl*.

This Owl was oftener seen at Murphy's in winter than any other. There it was sometimes found during the day, on or near the ground, in low chaparral, but quite as often in lone leafless trees; once, at least, in bright sunshine. The specimen in the collection was seen to catch and eat a *Parus montanus*.

73845	— ad.	Soda Springs.....	Sept. 13, 1877
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Family FALCONIDÆ: HAWKS, EAGLES, KITES, ETC.

137. *Falco communis*, β . *nævius*, Gmel.—*American Peregrine Falcon*.

The Duck Hawk is a somewhat rare winter sojourner in the valleys of Central California. I have not seen it in the mountains.

[The two specimens sent are in very dark plumage, being quite uniformly black above and very heavily marked beneath. They are quite identical, however, with Eastern specimens which I have seen, and are fully as large.—R. R.]

76618	♀ juv.	Stockton.....	*Oct. 27, 1878
76619	♀ juv.	.....do.....	Oct. 29, 1878

138. *Falco mexicanus*, β . *polyagrus*, Cass.—*Prairie Falcon*.

I saw a few specimens of this Falcon at Marysville in the winter of 1877–78. I think that I saw one at Stockton, November 19, 1878. The one in the collection is the only specimen seen at the Summit Meadows in the fall of 1877.

[The single specimen in the collection is in the very rare perfect adult plumage. This is *transversely barred* above with pale reddish umber and bluish gray, quite unlike any other American Falcon.—R. R.]

76620	♂ ad.	Summit Meadows.....	Sept. 16, 1877
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139. *Æsalon columbarius*, (Linn.).—*American Merlin*; *Pigeon Hawk*.

The Pigeon Hawk is occasionally seen in the valleys and foot-hills in winter. I have never seen it in any part of this country in summer.

76621	♂ juv.	Stockton.....	Nov. 2, 1878
76622	♂ juv.	.....do.....	Oct. 27, 1878

* Weight $2\frac{1}{2}$ pounds; feet pale greenish yellow.

*140. *Tinnunculus sparverius*, (Linn.).—*American Kestrel*.

This is a very common constant resident of the valleys and foot-hills as high as Murphy's, and is a common summer resident of the pine forests.

74290	♂ juv.	*Soda Springs.....	Fall, 1877
74291	♂ ad.	*Murphy's.....	Spring, 1877
74292	♀ ad.	.....do.....	Spring, 1877

141. *Pandion haliaëtus*, *β. carolinensis*, (Gm.).—*American Osprey*; *Fish Hawk*.

I do not remember seeing this bird in California. This may be owing to the fact that so many of the streams are muddied by the extensive mining operations in the mountains. I have known it well since a boy, consequently it could not have escaped my observation. I am told, however, that it inhabits the Upper San Joaquin Valley, and it is quite likely that it does the Upper Sacramento also.

*142. *Elanus leucurus*, (Vieill.).—*White-tailed Kite*.

This is a common constant resident of Stockton, where I have seen as many as twenty at the same moment within a circle of half a mile. I have seen it at Marysville in winter. It is rarely out of the tule marshes.

The specimens I sent were stained by falling in muddy water or from catching mice in a large alfalfa field in the "reclaimed" tule ground. Some of them I tried to wash, but with indifferent success.

*73841	— ad.	*Stockton	Mar. —, 1878
73842	— ad.	.....do.....	Nov. —, 1877
74293	ad.	.....do.....	Apr. 17, 1877
74294	♀ ad.	.....do.....	Apr. 20, 1877
74295	♀ ad.	.....do.....	Apr. 14, 1877

143. *Circus hudsonius*, (Linn.).—*Marsh Hawk*.

The Marsh Hawk is a very common resident of the valleys, but is most numerous in winter. The adult plumage of the male is quite common.

76630	♀ ad.	Stockton?
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144. *Accipiter cooperi*, (Bonap.).—*Cooper's Hawk*.

This Hawk seems to be rare in the interior of California, since I have seldom recognized it within the last two years. I was well acquainted with it in Pennsylvania nine or ten years ago. In the fall of 1877 I winged, at Soda Springs, what I think was a specimen of this bird, and in December, 1878, I shot one at Copperopolis.

145. *Accipiter fuscus*, (Gmel.).—*Sharp-shinned Hawk*.

This Hawk is common during summer in the upper Sierras, and is occasionally seen in the foot-hills and valleys in winter. I did not see it at Big Trees in July and August, nor do I remember having seen it at Marysville last winter.

The one in the contribution of December, 1878, is all I have seen at Stockton since September 6. It was often seen at Soda Springs and Summit Meadows in fall.

73843	♂ juv.	Soda Springs.....	.....
73844	♀ juv.	do .....	.....
76623	♂ juv.	Stockton	Sept. 24, 1878
76624	♀ juv.	Murphy's.	Spring, 1877

***146. *Buteo borealis*, β . *calurus*, (Cass.).—*Western Red-tailed Hawk*.**

This Hawk was oftener seen at Soda Springs in the fall of 1877 than any other species of the genus. Two of the four which were shot there were young birds, nearly grown. I have seen one specimen, which was shot at Marysville about November 1.

Red-tailed Hawks are very common constant residents of the valleys, and in summer are quite as common in the mountains.

74296	— juv.	Soda Springs	Sept. 15, 1877
76625	— juv.	Big Trees	July —, 1878
76626	♂ juv.	Stockton	Oct. 20, 1878
76627	♀ ad.	do	*Oct. 25, 1878

***147. *Buteo lineatus*, β . *elegans*, (Cass.).—*Red-bellied Hawk*.**

Buteo elegans is very common at Stockton in summer. It was quite abundant as late as October 1, 1878, but was rarely seen after the 15th, although individuals were observed November 10 and 16.† A nest seen June 8, in nearly horizontal limbs of an oak, was forty or fifty feet from the ground, irregular in shape, about eighteen inches thick, and, judging by the leaves attached to some of the twigs, was built of dead and living twigs and sticks. The cavity of the nest must have been shallow, as its occupant could be seen at a short distance from the base of the tree.

74297	♂ ad.	*Stockton.....	May 1, 1878
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148. *Archibuteo lagopus*, β . *sanctijohannis*, (Gmel.).—*American Rough-legged Hawk*.

The Rough-legged Hawk is the only *Archibuteo* I have been able to shoot at Stockton this season, and I think this is the first I have seen since September 6. It had a larger companion. I saw two of these Hawks in a cage at Marysville last winter; both had been slightly winged. They were very tame. I have seen only three or four black-plumaged specimens in the past three years. One of these was at Big Trees last August, and one at Stockton April 1, 1878.

76628	— juv.	Stockton.....	†Nov. 23, 1878
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* Weight 3 pounds 5 ounces. Iris brownish-orange.

† In a letter dated December 28, Mr. Belding observes that it had been rare up to that date at Stockton.—R. R.

‡ Iris pale brownish yellow; web of mouth rich lemon-yellow.

149. *Archibuteo ferrugineus*, (Licht.).—*California Squirrel Hawk*.

I saw a splendid specimen of this fine Hawk at Marysville last winter. It was shot about January 1.

*150. *Aquila chrysaëtus*, *β. canadensis*, (Linn.).—*American Golden Eagle*.

This Eagle is rarely seen in Central California. I saw one near Stockton May 14, 1878, and two young ones that were caught in the mountains of Tuolumne County in 1877 by Indians; also one at Soda Springs in 1876. These are probably all I have seen in three years. Formerly it was more numerous in the valleys.

151. *Haliaëtus leucocephalus*, (Linn.).—*White-headed Eagle*; *Bald Eagle*.

The Bald Eagle was formerly common in the valleys, particularly in winter. It now rarely visits Stockton or Marysville, but is said to be common in the southern part of the San Joaquin Valley.

Family CATHARTIDÆ: The AMERICAN VULTURES.

*152. *Rhinogryphus aura*, (Linn.).—*Turkey Buzzard*.

The Turkey Buzzard is a common resident of Central California, being found as high up in the mountains as Murphy's. It was seen nearly every day at the Big Trees in July and August.

76629	— ad.	Murphy's.....	Spring, 1877
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153. *Pseudogryphus californianus*, (Shaw).—*California Condor*.

The California Condor appears to be very rare in this region. I have seen it on no more than two or three occasions in Yuba County in winter, and do not think I have seen it at any other place. They probably visit the vicinity of Marysville only in winter, and are never common.

Family COLUMBIDÆ: The PIGEONS or DOVES.

*154. *Columba fasciata*, Say.—*Band-tailed Pigeon*.

I have seen but few of these birds in the Sierras in summer, though it probably breeds there, as I have occasionally shot young birds at Big Trees, apparently about a month old. They were at that age excellent food, which cannot be said of it at any other time, its flesh being very bitter from eating acorns in winter and oak-buds in spring.

It is sometimes common in the foot-hills in winter, but never abundant as compared with the abundance of the Passenger Pigeon of the Atlantic States.

76631	♂ ad.	Murphy's.....	Dec. —, 1877
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*155. *Zenædura carolinensis*, (Linn.).—*Mourning Dove*.

The Mourning Dove is abundant in all parts of the valleys and foothills in summer, at which time it is rather common between Murphy's and Big Trees, though found principally in the open places of the forest.

It is rare at Stockton in winter, though quite common at Marysville during the same time. Flocks of fifty or a hundred may be found every winter at the latter place, although not nearly so abundant at that time as in summer.

At Murphy's, August 29, 1878, I found two nests, both of which contained eggs. Two days later I found young birds in one of them.

Family TETRAONIDÆ: The GROUSE.

*156. *Canace obscura*, (Say).—*Dusky Grouse*.

This fine game bird is quite abundant near the summit of the Sierra Nevada, latitude 39°, and a few breed at Big Trees, where I once found a nest containing seven eggs, which is about as many as they ever lay, judging by the many flocks of young birds of less number which I have seen. They utter, from a tree, when alarmed, the same "kuk, kuk," as nearly as I remember, a Prairie Chicken (*Cupidonia cupido*) does under similar circumstances. In August and September the males keep by themselves, and are generally found singly. Toward the last of September I have had much difficulty in finding this bird at places where it had previously been common. The explanation may be that they are then in the tall, dense evergreens, or have, as they are said to do, gone well up the adjacent peaks, or, possibly, lower down; but this last is not likely, as they do not appear to be more numerous at Big Trees or the lower portion of their range in winter than in summer. I have not seen it at or several hundred feet above Murphy's.

It is said to remain in particular trees much of the time in winter, and to be found by hunters by its droppings on the snow.

Family PERDICIDÆ: The PARTRIDGES and QUAILS.

*157. *Oreortyx picta*, (Douglas).—*Californian Mountain Quail*.

This Quail is a common summer resident of the Sierra from an elevation of about 4,000 feet to 8,500 feet, and is generally distributed through the forest except where there is unusual scarcity of water or where the herbage is closely grazed by sheep. A few breed near Murphy's and between that place and Big Trees. Every winter it is common in the upper edge of the chaparral belt in Calaveras County, and it is usually common in November in Yuba County at an altitude of six hundred feet or less; while near Oroville and on the Honcut Creek, I have seen it nearly on a level with the Sacramento Valley.

When scattered, their call is much like that of young turkeys. In breeding season, the male has a loud, modulated, very agreeable note. They hatched at Big Trees about July 8, 1878. Their eggs are cream-

colored, unspotted, and the usual number is about fifteen. This bird is easily shot when not quite grown, and appears to become confused when migrating, especially in fall, when they are inexperienced; but when grown, and have learned to fear the hunter, they are bagged with difficulty. When making their vertical migrations, the Indians catch many of them in compact brush fences about two feet high, running obliquely from a creek or cañon over a hill. Occasional holes are left in the fence in which snares of hair or twine are placed. Some of these fences are more than a fourth of a mile long. Many of the birds are taken alive from the snares and sold to the "whites." They soon become tame in cages, and could probably be domesticated with little trouble. The Indians claim to distinguish sex by the length of the plume, but I have reasons for doubting their ability to do so.

A nest found at Big Trees in July, 1878, contained 13 eggs, was built on the ground in a thick growth of "Rock Rose," an evergreen shrub about two feet high, without branches until near the top; leaf very minutely divided. I did not see the nest until the eggs were nearly hatched.

[Mr. Belding observes in one of his communications that these birds are very fond of the service-berry (fruit of the *Amelanchier canadensis*), and adds: "Mountain Quail are very plentiful, and easily shot, at Soda Springs, in September and October, and when travelling from one locality to another."—R. R.]

73979	♂ ad.	*Murphy's	Dec. —, 1877
73980	♂ ad.	.....do	Mar. —, 1877

*158. *Lophortyx californica*, (Shaw).—*Californian Valley Quail*.

This is an abundant constant resident of the valleys and foot-hills. It is also common in summer in the pine forests as high as Big Trees, where, however, it is found only in and around the fields and meadows near human habitations, returning, at the approach of winter, to the chaparral belt.

In the mating season I have seen the males fight fiercely, much as turkeys do, the others of the flock appearing to take a great interest in the combat, in the mean time making a great outcry. In the first of the hunting season they are not very wild, and run a great deal, but when they have been shot at, scattered, persistently followed, and thoroughly frightened, they lie very close, especially if driven from their thickets to stubble-fields and ploughed ground. They do not increase much in the foot-hills after a dry winter. This Quail is attached to certain localities,—drinks, feeds, and hides in its own favorite places. The latest broods are hatched in the early part of September.

73981	♂ ad.	*Murphy's	Spring, 1877
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Family CHARADRIIDÆ: The PLOVERS.

159. *Ægialitis montana*, (Townsend).—*Mountain Plover*.

This species, known here as the "Bull-head Snipe," usually arrives at Stockton and Marysville in November, and I have seen a few in October. It frequents the dry plains, but is oftener found in fields that have been prepared for or sown with wheat than any other localities. It sometimes visits the low, rolling, gravelly hills to the east of the valley, and is often abundant, especially previous to the severe rains of winter. Some winters, however, I have not seen it at all in California. It was unusually abundant at Stockton in December, 1878.

76637	— juv.	Stockton	Nov. 3, 1878
76632	— juv.	.....do	Nov. 3, 1878

* 160. *Ægialitis vocifera*, (Linn.).—*Kill-deer Plover*.

The Kill-deer is a common resident of the valleys and foot-hills. I have not seen it higher up than Murphy's.

Family RECURVIROSTRIDÆ: The AVOCETS and STILTS.

161. *Recurvirostra americana*, Gm.—*American Avocet*.

The Avocet is very rare in the interior valleys. It is occasionally seen at Marysville in spring. I have not yet observed it at Stockton.

* 162. *Himantopus mexicanus*, (Müller).—*Black-necked Stilt*.

The Stilt is a common summer resident at Stockton. It was first seen here April 13, 1878, and had left by September 7. It breeds both here and in Sutter County.

76633	♀ ad.	*Stockton	Apr. 13, 1878
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Family SCOLOPACIDÆ: The SNIPES, SANDPIPERS, etc.

163. *Gallinago wilsoni*, (Temmin.).—*Wilson's Snipe*.

This bird is a common winter resident of Central California, being found in suitable localities in the foot-hills as high up as Murphy's. It sometimes remains as late as May 15, and was seen at Stockton as early this year as September 7.

A few are said to breed here, but this is very doubtful.

74287	— ad.	Stockton	Spring, 1878
76638	— ad.	.....do	Oct. —, 1878

164. *Macrorhamphus griseus*, (Gmel.).—*Red-breasted Snipe*.

This bird was first seen at Stockton April 20, 1878. The first seen in the following fall was on November 5. It is sometimes, though rarely, quite common, but it appears to be very irregular in its movements.

74285	♀ ad.	Stockton	Apr. 25, 1878
74286	♀ ad.	.....do	Apr. 25, 1878
76639	♀ ad.	.....do	Nov. 5, 1878

165. *Tringa minutilla*, (Vieill.).—*Least Sandpiper*.

An abundant winter resident of the valleys. Is found at Stockton from about September 18 till the first of April.

76640	— juv.	Stockton.....	Fall, 1877
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166. *Gambetta melanoleuca*, (Gm.).—*Tell-tale*.

The Tell-tale is rather common in spring and fall. I shot one May 23. It was first seen at Stockton April 15. I have not observed it since the first of November.

76635	— ad.	Stockton.....	Head only.
76636	— ad.	..... do	Do.

167. *Gambetta flavipes*, (Gm.).—*Yellow-legs*.

Of this bird I can only say that I shot one September 13, and a few days afterward saw what I thought was another.

76634	— ad.	Stockton.....	Sept. 13, 1878
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168. *Tringoides macularius*, (Linn.).—*Spotted Sandpiper*.

This seems to be a rare bird in Central California. I saw three at Stockton in the spring of 1878, and the same number the following fall. It was first noticed at Stockton May 1. None were seen after October 3. It appears to stay with us about a month in spring and the same time in fall.

A bird of this species nightly visited a pond in the rear of the hotel at Murphy's in September, 1878. It came about dusk, after the Swallows and Flycatchers had retired and Bats had taken their places, and circled over the water as if catching flies, although it never made an abrupt curve or checked its rapid flight. It kept usually about three feet from the water, but went as high as six or eight feet occasionally.

75327	— juv.	Big Trees.....	Aug. 3, 1878
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169. *Numenius longirostris*, Wils.—*Long-billed Curlew*.

I shot one of these birds at Stockton May 23. It is seen at rare intervals in winter, fall, and spring, but I do not know that it remains here all summer. I do not think I have seen it in this State later than May 23.

170. *Numenius hudsonicus*, Lath.?—*Hudsonian Curlew*?

In the spring of 1871, I shot at Marysville a small grayish Curlew, which was not *N. longirostris*, and may have been *N. borealis*.* It must be rare in this part of California. It was in a flock composed of others like it.

*As *N. borealis* has not yet been recorded from west of the Rocky Mountains, the species was probably *N. hudsonicus*.—R. R.

Family ARDEIDÆ: The HERONS.

*171. *Ardea herodias*, Linn.—*Great Blue Heron*.

An abundant constant resident.

*172. *Herodias alba*, β. *egretta*, (Gm.).—*American Egret*.

This species was first noticed at Stockton, in the spring of 1878, on the 1st day of April. It is common in summer, and my impression is that it is a constant resident, as it remained here this year up to the 5th of December.* On the 7th of December, 1878, I saw a flock of forty or fifty at Stockton.

76641	— ad.	Stockton.....	Sept. 24, 1878
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*173. *Garzetta candidissima*, (Gm.).—*Lesser Egret*.

The first of this species observed after March 6, 1878, was a flock of seven or eight on May 21. It was rarely seen after October 4, and I supposed it had gone, but on the 20th of November I saw a flock of nearly a hundred. I have not noticed it since that time, though it may have gone to the centre of the tule swamps. It is an abundant summer resident at Stockton.

76642	— ad.	*Stockton.....	July —, 1877
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*174. *Butorides virescens*, (Linn.).—*Green Heron*.

The Green Heron is an abundant summer resident of the valleys. It was first seen at Stockton April 15, 1878, and disappeared in the first week of October.

Many built their nests in the willows by the San Joaquin River. I examined three nests. In one of them were six eggs; in the other two, four eggs each.

74300	♂ ad.	*Stockton.....	Apr. 15, 1878
74301	— ad.	Murphy's.....	May —, 1877

*175. *Nyctiardea grisea*, β. *nævia*, (Bodd.).—*Black-crowned Night Heron*.

This Heron is a common resident of the valleys. I noticed it at Marysville in the winter of 1877–78.

74302	♂ ad.	*Stockton.....	May 1, 1878
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*176. *Botaurus lentiginosus*, (Montag.).—*American Bittern*.

The Bittern is a very abundant resident in the vicinity of Stockton. I also saw it at Marysville last winter.

76643	♂ ad.	*Stockton.....	Apr. 13, 1878
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* * The date of writing.—R. R.

177. *Ardetta exilis*, (Gm.) —Least Bittern.

The Least Bittern is very rare,—certainly not often seen. I saw a straggler or migrant at Murphy's in the spring of 1877, and one at Stockton during the fall of 1878. These are all I have met with in two years.

76644	♀ juv.	Stockton..	Sept. 14, 1878	Taken from a <i>Buteo elegans</i> .
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Family IBIDIDÆ: The IBISES.

178. *Plegadis guarauna*, (Linn.).—White-faced Glossy Ibis; Brouzed Ibis.

The Glossy Ibis was first seen at Stockton in the spring of 1878, on June 9, when three were noticed. A small flock was observed here on September 18.

I have shot it here, some years ago, as early as July or the first of August, and have seen several flocks July 25, 1870, in Sutter County. It is at times quite common in Sutter County in spring.

Family GRUIDÆ: The CRANES.

179. *Grus canadensis*, (Linn.).—Sand-hill Crane.

A common winter resident of the valleys, arriving the last of September and leaving about the first of May. I shot one at the Summit Meadows in August.

Family RALLIDÆ: RAILS, GALLINULES, and COOTS.

180. *Rallus virginianus*, Linn.—Virginian Rail.

This Rail appears to be a rare bird in California, though occasionally seen in winter.

76645	♀ ad.*	Stockton.....	Apr. 9, 1878
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181. *Porzana carolina*, (Linn.).—Sora Rail.

I have seen but five or six of this species in California. One of them was shot in winter at Marysville.

182. *Porzana jamaicensis*, (Gm.)?—Little Black Rail.

I remember shooting a very small dark Rail at Stockton more than twenty years ago, and suppose it was this bird. It must be very rare.

***183. *Gallinula galeata*, (Licht.).—Florida Gallinule.**

A rare constant resident in the vicinity of Stockton. I have seen on an average about three annually.

76646	— juv.	*Stockton.....	Sept. 16, 1878
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* Web of mouth, eyelids, or iris (or both) vermilion.

*184. *Fulica americana*, Gm.—*American Coot*.

The Coot is an abundant constant resident of the valleys. The only place where I have seen it in the foot-hills is Salt Spring Valley reservoir, between Milton, Calaveras County, and Murphy's, altitude about 1,200 feet, and there only in winter and spring.

76647	♂ ad. *Stockton.....	Apr. 24, 1878
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Family ANATIDÆ: The SWANS, GEESE, and DUCKS.

185. *Cygnus americanus*, Sharpless.—*Whistling Swan*.

I saw *C. americanus* in market November 6, 1878, and a few Swans flying in November, 1878.

The American Swan is the only Swan I have shot in California. I may add, however, that I have not shot many. Ten years ago I hunted all winter in Mason County, Illinois, and saw and heard Swans there which impressed me as being different from Swans I had shot here.*

186. *Chen hyperboreus*, (Pallas).—*Snow Goose*.

The Snow Goose is abundant in California in winter. It arrives in the valleys in October. Was first seen this year (1878) on the 12th of that month. It usually remains until about May 1.

187. *Chen albus*, Cass.—*Lesser Snow Goose*.

Regarding this obscurely known species, which appears to bear to *C. hyperboreus* about the same relation that *Branta hutchinsi* does to *B. canadensis*, Mr. Belding's notes give the following valuable information:

"Shot at Stockton, Oct. 18, 1878. Weight, 3 lbs., 1 oz. Flesh light colored; iris bluish brown; bill deep black. No companion of its kind with it, but accompanied by a small flock of Mallard Ducks. I preserved the wings of one of this species at Marysville in the winter of 1874. It was killed during unusually cold weather, and the person who shot it said that it was alone. I left the wings with a shooting club, and last winter was told they had not been able to duplicate them! I was attracted by the dark centres of the tertials, their silky texture and their length. The color of the tarsi, their slenderness, and the color of the flesh—to say nothing of the plumage†—makes me think it a very different bird from *A. hyperboreus* (perhaps *A. albus*). The tarsi were pale dirty blue, or bluish clay-color."

76654	— juv. Stockton.....	Oct. 18, 1878
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188. *Chen rossi*, (Baird).—*Ross's Snow Goose*.

[Mr. Belding says that according to the information of a friend, a sportsman residing in Stockton, this Goose is "quite common" on the San

* The latter were probably *C. baccinator*.—R. R.

† The last character, however, is of no importance, the young of *C. hyperboreus* having exactly the same colors.—R. R.

Joaquin River, coming south with other Geese in the fall. It is said to become very tame when winged, following its captor after being kept a little while.—R. R.]

77163	— ad.	Stockton market	Dec. —, 1878
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189. *Anser gambeli* (Hartlaub).—*American White-fronted Goose.*

The White-fronted Goose was first seen at Stockton September 7, 1878, though rare until October. It is more abundant than any other of the Geese which visit California, usually coming first and leaving last.

Geese, in the aggregate, are very abundant in the valleys, and are in some localities so destructive to young wheat that farmers resort to various expedients to protect their grain from their ravages; among others, that of hiring hunters to ride over their fields and drive them away.

76651	— ad.	Stockton?	Head only.
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190. *Branta canadensis*, (Linn.).—*Canada Goose.*

This species usually arrives and departs at about the same time as the *Anser gambeli*. Toward the middle of March, when hunting in the foothills, sometimes not far below the snow-line, on pleasant sunny mornings, flocks of "Honkers" have often been seen, high above the hills, going toward the summit of the mountains, probably on their way to the valleys and lakes east of the Sierra Nevada.

76648	— ad.	Stockton?	
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191. *Branta hutchinsi*, *β. leucoparia*, (Brandt).—*White-cheeked Goose.*

[In regard to this species, Mr. Belding writes:—"I send head and wing of a 'brant,' which I cannot match with any of the descriptions in vol. ix, Pacific R. R. Reports. You must be well acquainted with it, as it is abundant in California in winter. It is by some called the 'Squawking Goose.' Tail-feathers 16."—R. R.]

76650	— ad.	Stockton	Dec. —, 1878	Head only.
76649	— ad.	.....do		Head, wing, and tail.*

192. *Dendrocygna fulva*, (Gm.).—*Fulvous Tree Duck.*

This Duck is rarely seen in the interior at or north of Stockton. I have seen one in market here; also a fine specimen shot at Marysville last winter. It is said to be more common in the southern part of the San Joaquin Valley.

193. *Anas boschas*, (Linn.).—*Mallard; Green-head.

The Mallard is a common constant resident of the valleys, and a few breed in the lakes of the Upper Sierras. It is sometimes abundant in

* "Squawking Goose. Rarely grows any larger."

the valleys in winter, and is at that time an occasional visitant to the creeks and ponds in the foot-hills. A brood of young was noticed at Stockton May 9, 1878.

*194. *Chaulelasmus streperus*, (Linn.).—*Gadwall*.

The Gadwall is a common constant resident of the valleys. Its favorite haunts are the tule swamps, both in summer and winter.

195. *Nettion carolinensis*, (Gm.).—*Green-winged Teal*.

The Green-winged Teal is a common, sometimes abundant, winter sojourner of the valleys, where it remains from about September 15 to April 15. It is an occasional winter visitant to the foot-hills, as high as Murphy's.

*196. *Querquedula cyanoptera*, (Vieill.).—*Cinnamon Teal*.

This Duck begins to arrive about March 1, and from about April 1 to October is quite common in the tule marshes. A few remain as late as October 15.

74204	♂	ad.	*Stockton.....	Apr. 13, 1878
74205	♂	ad.	.....do	Apr. 8, 1878
74206	♀	ad.	.....do	Apr. 8, 1878

197. *Mareca americana*, (Gm.).—*Bald-pate; American Widgeon*.

The Widgeon is an abundant winter sojourner of the valleys, at which time it occasionally visits the foot-hills. A pair were seen at Stockton as late as May 28, 1878.

198. *Dafila acuta*, (Linn.).—*Sprig-tail; Pin-tail*.

The Sprig-tail is a common winter sojourner of the valleys. A pair was observed on May 28, 1878, at Stockton. There was at that time a slight rise in the river. Few, if any, breed here.

199. *Spatula clypeata*, (Linn.).—*Shorellover; Spoon-bill Duck*.

The Spoon-bill Duck is a common, though never abundant, sojourner of the valleys in winter. It was not seen at Stockton after May 9 in the spring of 1878, though it generally remains as long as any of the winter ducks—in fact, is usually the last of them to leave.

*200. *Aix sponsa*, (Linn.).—*Summer Duck; Wood Duck*.

The Wood Duck is a common resident of Central California. I have shot it in winter as high up as Murphy's.

201. *Fulix marila*, (Linn.).—*Scaup Duck; Greater Black-head*.

The Scaup Duck is a rather rare winter sojourner in the valleys.

76652	♂	ad.	Stockton.....	Apr. 1, 1878
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202. *Fulix affinis*, (Eyton)?—*Lesser Black-head*.

I am not certain in regard to this species, but think I have seen many of them on the sloughs near Marysville in winter only.

I can say nothing of *F. collaris*. Have shot it, I believe, at Stockton and Marysville.

203. *Aythya vallisneria*, (Wils.).—*Canvas-back Duck*.

The Canvas-back is quite common at Stockton and Marysville in winter, especially when the streams are high and gales prevail on the coast.

204. *Aythya americana*, (Eyton).—*Red-head*.

The Red-head is rather a rare winter visitant to the interior valleys of California.

205. *Bucephala clangula*, β . *americana*, (Bp.).—*American Golden-eye*.

Two of these Ducks were found in the Stockton market, February 5, 1879. It is a rare winter visitant here.

77165	♀ ad.	Stockton market	Feb. 5, 1879
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206. *Bucephala albeola*, (Linn.).—*Buffle-head; Butter-ball*.

The Butter-ball is a somewhat rare winter sojourner at Marysville and Stockton.

207. *Erismatura rubida*, (Wils.).—*Ruddy Duck*.

The Ruddy Duck is usually common at Stockton in winter.

76653	♀ ad.	Stockton.....	Oct. 11, 1878	Head, wing, tail, and foot.
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208. *Mergus castor*, β . *americanus*, (Cass.).—*American Sheldrake*.

209. *Mergus serrator*, (Linn.).—*Red-breasted Sheldrake*.

[Mr. Belding does not mention these species separately, or either of them, by name, but a note headed "*Mergus* ——" is to the effect that he "has shot *two species* of Fish Ducks" in California. They were most probably these species.—R. R.]

210. *Lophodytes cucullatus*, (Linn.).—*Hooded Sheldrake*.

The Hooded Merganser was quite often seen at Marysville last winter, but it was not numerous, nor have I ever seen it so. It is a winter sojourner of the valleys.

Family PELECANIDÆ: The PELICANS.

211. *Pelecanus erythrorhynchus*, Gm.—*American White Pelican*.

Pelicans are irregular winter visitors to Stockton and Marysville. I shot one at the former place, March 15, nearly three years ago, which was probably an adult male.

Family GRACULIDÆ: The CORMORANTS.

212. *Graculus dilophus*, β . *floridanus*, Aud.—*Double-crested Cormorant*.

Four Cormorants shot at this place in the spring of 1878 appeared to belong to the same species, and to resemble the Cormorant so common here (Stockton) in spring.

They have probably sought more suitable ground. No Cormorants have been seen from September 6 to the present date (December 3), but formerly they were abundant at all seasons, particularly where sloughs penetrated the oaks of the uplands.

[NOTE.—I cannot distinguish these specimens, nor, indeed, other Californian ones, from Eastern examples referable to the so-called "*floridanus*."—R. R.]

76656*	♀ ad.	Stockton?	Apr. 6, 1878	Head only.
76655†	♀ ad.	.....do	Mar. 22, 1878	

213. *Graculus violaceus*, (Gm.).—Violet-green Cormorant.

I have seen *G. violaceus* at Marysville in the spring.

Family LARIDÆ: The GULLS and TERNS.

214. *Larus californicus*, Lawr.—California Gull.

Gulls rarely visit the vicinity of Stockton, and then only when there is a gale from the coast. The specimen sent is different from the Gulls which usually visit us. It was alone.

76657	— ad.	Stockton.....	Oct. 15, 1878
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***215. *Sterna forsteri*, Nutt.—Forster's Tern.**

Forster's Tern was first seen at Stockton April 17, 1878, two days after which it became common. It left Stockton previous to September 7.

74289	♀ ad.	*Stockton.....	Apr. 17, 1878
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***216. *Hydrochelidon nigra*, (Linn.).—The Black Tern.**

The Black Tern was first seen at Stockton April 24, 1878. It was abundant from that date until June 8, and probably later. It left Stockton before September 7.

74288	♀ ad.	*Stockton.....	Apr. 25, 1878
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Family PODICIPIDÆ: The GREBES.

217. *Æchmophorus occidentalis*, (Lawr.).—Western Grebe.

I have seen four of these Grebes at Stockton during the present season (1878). I have shot four of them, two in spring, two in fall. Those

* "Iris green; eyelids bordered with rounded spots of bluish white."

† "Eyes sea-green; eyelids bordered with rounded spots of pale blue; interior of mouth metallic cobalt-blue, extending far down the throat, where it assumes a blackish hue."

‡ "Iris blue, or brown-blue; web of mouth and eyelids orange-red, like spot on mandible; legs and feet pale clay-fleshy."

found in fall were shot with much less difficulty than the spring birds, perhaps because they were young. I do not know whether they breed here.

74460	♂ ad.	Stockton.....	June 3, 1878
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218. *Æchmophorus clarki*, (Lawr.).—Clark's Grebe.

[There are no notes concerning this species.—R. R.]

74203	— ad.	Stockton.....	Apr. 26, 1878
76659	— ad.	.....do.....	Oct. 3, 1878
76658	— ad.	.....do.....	*Sept. 24, 1878

219. *Dytes auritus*, *β. californicus*, (Lawr.).—American Eared Grebe.

The bird shot at Murphy's and the one shot at Stockton are all I have seen of this species in two years.

73846	— ad.	Murphy's.....	Apr. 16, 1877	"Iris and eyelids red." Do.
74461	♂ ad.	Stockton.....	May 9, 1878	

220. *Podilymbus podiceps*, (Linn.).—Thick-billed Grebe.

The specimen sent was the only one seen at Murphy's in the spring of 1877. It was apparently only a visitant. I have seen them in the small lakes near the summit in fall, and they are not rare in the sloughs in the valleys in winter.

73847	— ad.	Murphy's.....	Spring, 1877
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CATALOGUE OF A COLLECTION OF BIRDS OBTAINED IN GUADELOUPE FOR THE SMITHSONIAN INSTITUTION, BY MR. FRED. A. OBER.

By **GEORGE N. LAWRENCE.**

Mr. Ober collected in Guadeloupe during August and September, 1878, and sent to the Smithsonian 132 specimens of birds; in his notes he enumerates 45 species.

Early in October he engaged his passage to New York, and went on board the vessel, but she was detained in port for over two weeks by adverse winds, and did not arrive here until November 13. Mr. Ober left the United States in December, 1877, making an absence of nearly two years. The result of his explorations has proved to be quite as satisfactory as was expected.

While in Guadeloupe, Mr. Belanger gave him a copy of Dr. L'Herminier's catalogue of the birds observed in Guadeloupe; it enumerates 135 spe-

* "Bill bright yellow, except ridge; space before eye white; ridge of bill brown; iris orange. Length, 24.00."

cies. I think it is of much interest, and the number of species being so greatly in excess of those reported by Mr. Ober, I have thought best to subjoin a copy of it.

As will be noticed, a large number of the species named in it, and not procured by Mr. Ober, are migrants, but yet of the others, there are many that might be supposed to exist there still. Through the exertions of Mr. Vitrae it is to be hoped the number of species given by Mr. Ober will be greatly increased, and some of those named by Dr. L'Herminier be rediscovered.

Catalogue des oiseaux observés à la Guadeloupe par le Docteur F. L'Herminier, de 1827 à 1844.

NOTE!—Les espèces marquées d'une croix ont également été observées à la Martinique.

- | | |
|--|---|
| × <i>Falco peregrinus</i> Gmel. | × <i>Tyrannus matutinus</i> Vieill. |
| × „ <i>sparverius</i> Gmel. | „ sp. |
| × „ <i>columbarius</i> Gmel. | Plathyrinchus L'herminieri Less. |
| × „ <i>cyaneus</i> Lesson. | × <i>Muscicapa olivacea</i> Wilson. |
| „ <i>haliaetus</i> Gmel. | × <i>Quiscalus versicolor</i> Vieillot. |
| × <i>Strix nudipes</i> Daudin. | × <i>Fringilla noctis</i> Gmel. |
| <i>Psittacus purpureus</i> Gmel. | × <i>Emberiza olivacea</i> Gmel. |
| <i>Picus L'herminieri</i> Lesson. | × „ <i>oryzivora</i> Gmel. |
| × <i>Picus varius</i> Wilson. | × <i>Loxia portoricensis</i> Daud. |
| <i>Cuculus minor</i> Gmel. | × <i>Columba aurita</i> Temm. |
| × <i>Crotophaga ani</i> Lath. | × „ <i>leucoptera</i> . |
| × <i>Alcedo torquata</i> Lath. | × „ <i>leucocephala</i> Lath. |
| × „ <i>aleyon</i> Lath. | × „ <i>martinica</i> Gmel. |
| × <i>Ornismya cristata</i> Lesson. | × „ <i>mystica</i> Tem. |
| × <i>Trochilus granatina</i> Lath. | × „ <i>portoricensis</i> Tem. |
| × „ <i>holosericeus</i> Lesson. | × „ <i>passerina</i> Tem. |
| <i>Cypselus (Acanthylis oxyura)</i> Bonap. | × <i>Ortyx virginianus</i> . |
| „ <i>collaris</i> Wilson. (<i>Hirundo</i> | × <i>Fulica atra</i> Wilson. |
| <i>pelagica</i> .) | × <i>Gallinula galeata</i> Bonap. |
| <i>Caprimulgus virginianus</i> Gmel. | × <i>Fulica martinicensis</i> Gmel. |
| <i>Sciurus guadeloupensis</i> . | × <i>Rallus crepitans</i> Gmel. |
| × <i>Nectarina antillensis</i> Lesson. | × „ <i>carolinus</i> Bonap. |
| × <i>Sylvia varia</i> Lath. | × <i>Charadrius pluvialis</i> Lesson. |
| × <i>Thriothorus littoralis</i> Vieill. | × „ <i>vociferus</i> Wilson. |
| <i>Ramphocinclus tremulus</i> Lafres. | × „ <i>wilsonius</i> . |
| × <i>Turdus densirostris</i> Vieillot. | × „ <i>semipalmatus</i> Bonap. |
| × <i>Turdus L'herminieri</i> Lafres. | × „ <i>helveticus</i> Bonap. |
| × <i>Turdus montanus</i> Lafres. | × <i>Vanellus cayennensis</i> Bonap. |
| × „ <i>aurocapillus</i> Lath. | × <i>Calidris arenaria</i> . |
| <i>Turdus supercilialis</i> L'herm. | × <i>Himantopus nigricollis</i> Vieill. |
| <i>Ficedula canadensis</i> Brisson. | × <i>Totanus flavipes</i> Vieillot. |
| × <i>Muscicapa ruticilla</i> Lath. | × „ <i>melanolencus</i> Vieillot. |
| × „ <i>cinerea</i> L'herm. | × „ <i>semipalmatus</i> Tem. |
| <i>Muscicapa</i> sp. | × „ <i>campestris</i> Vieillot. |
| × <i>Hirundo rufa</i> Lin. Lath. | × „ <i>macularius</i> Tem. |
| × „ <i>albiventris</i> Vieillot. | × „ <i>hypoleucus</i> Tem. |
| × „ <i>riparia</i> Linn. | × „ <i>melanopterus</i> L'herm. |
| × <i>Pipra musica</i> Gmel. | „ sp. |
| × <i>Bombycilla cedrorum</i> Vieill. | × <i>Limosa hudsonica</i> Swain. |

× *Limosa isabellina* L'herm.
 × *Scelopax gallinago* Wilson.
 × *Macrorhamphus griseus* Bonap.
 × *Tringa canutus* Lin.
 × „ *maculata* Vieillot.
 „ *rufescens* Vieillot.
 × „ *schinzii* Bonap.
 × „ *pusilla* Wilson.
 × „ *pugnax* Gmel.
 × „ *semipalmata* Wilson.
 × „ *himantopus* Bon.
 × „ *interpres* Gmel.
 × *Phalaropus Wilsoni* Bon.
 × *Numenius hudsonicus* Lath.
 × „ *borealis* Lath.
 × „ *longirostris* Wilson.
 × *Ibis falcinellus* Vieillot.
 × *Ardea cayennensis* Gmel.
 × „ *herodias* Wilson.
 × „ *cœrulea* Wilson.
 × „ *garzetta* Gmel.
 × „ *virescens* Lath.
 × „ *egretta* Gmel.
 × *Ciconia alba* Tem.
 × *Platalea ajaja*.
 Podiceps carolinensis Lath.
 × „ *Dominicanus* Gmel.
 × *Sala fulica* Vieillot.
 × *Tachypetes aquila* Vieillot.
 × *Phaeton aethereus* Lesson.

× *Lepturus candidus*.
 × *Lestris caribæus* L'herm.
 Larus atricilla Lesson.
 × *Sterna stolidus* Gmel.
 „ *galericulata*.
 „ *hirundo* Lin. Lath.
 × „ *minuta* Gmel.
 „ *bicolorata* L'herm.
 „ *deplorans* L'herm.
 „ *fuliginosa* Gmel.
 × „ *cantiaca* Tem.
 × „ *anglica* Montague.
 × „ *argentea*.
 Rhynchops nigra Tem.
 × *Procellaria diabolica* L'herm.
 × „ *mauping* L'herm.
 × *Thalassidroma leachii* Bonap.
 × *Puffinus major*.
 × „ *L'herminieri* Less.
 × „ *aterrimus* L'herm.
 × *Anas boschas* Lin.
 × „ *arborea* Lin.
 × „ *cyanoptera* Vieill.
 × „ *Dominica* Bonap. (*Erismatura dominica*.)
 × *Anas marila* Lin.
 × „ *americana* Gmel.
 × „ *acuta* Lath.
 × „ *clypeata* Lath.

GADELOUPE.

„This island is situated on the 16th parallel of latitude, and comprehends, under its general name of Guadeloupe, two islands, separated only by a narrow creek, called *Rivière Salée*. The larger, known as Guadeloupe, proper, is very mountainous, a ridge running its entire length, north and south. There are several extinct craters in this ridge of mountains (as many as fourteen, it is said), and in the southern termination is a volcano yet somewhat active. Smoke and steam and sulphur fumes are emitted, though there has been no eruption during the present century. Guadeloupe is well watered. More than fifty rivers descend from the mountains to the sea on either side. The forests are large and dense, but contain in them less animal life than one would expect.

“The adjacent island, called *Grande Terre*, is not quite so large as the other, being about 20 miles in length and 10 to 15 in breadth. It is low and flat, no elevation occurring of any height. This portion is well cultivated, and there are no forests or even tracts of wood.

“The formation of Guadeloupe, proper, is volcanic, while that of *Grande Terre* is of coral, though probably built upon volcanic tufa. The prin-

incipal port, Point à Pitre, is situated near the Rivière Salée and in Grande Terre. It contains a small museum, the *Musée de Lherminier*, which, under the energetic superintendence of its *directeur*, Monsieur L. Vitrac, promises to become of importance.

"It was founded by the late Dr. L'Herminier, who was an ardent naturalist, and discovered many new birds in this island and Martinique, some 40 years ago. His collections, containing type-specimens, and all his manuscript notes (I cannot ascertain that he ever published the results of his observations), perished in a disastrous fire that swept over Point à Pitre a few years since. Few birds are, as yet, in the museum; but there are very excellent and complete collections of crustacea, etc., and many fine specimens of aboriginal implements. It owes much of its progressiveness to its present directeur, and to Messieurs L. Guesde and St. Félix Colardeau, both of whom, one in archæology and the other in ornithology, take active part in promoting its advancement.

"There are a few birds here I did not find in any other island. The most prominent one is the Woodpecker, locally known as the '*Tappeur*', and named by Lesson *Picus Lherminieri*. I made a special excursion to obtain this bird, which is not abundant anywhere, and only found in certain localities.

"Another bird, the '*Perdix croissant*,' I found in this island, not having seen it, or even heard of it, in any other. Of this species I brought three alive to New York, of which two survived the passage.

"My collections here were made during the months of August and September; in obtaining them I visited the volcano and all adjacent forests on the west side, a valley half way down the west coast, the north side of the island, and places contiguous to Point à Pitre, and about the southern end of Grande Terre.

"To the gentlemen named above and to Monsieur G. Hurd, the *Directeur d'Intérieur*, and the U. S. consul, Capt. Chas. Bartlett, I am indebted for assistance in various matters.

—FREDERICK A. OBER.

—BEVERLY, MASS., Jan. 1, 1878."

Fam. TURDIDÆ.

1. *Margarops herminieri* (Lafr.).

" '*Pied jaune*.' "

"Length, ♂, 10½ in.; alar extent, 17; wing, 5½.

"Length, ♀, 10 in.; alar extent, 17; wing, 5¾.

"A resident of the wooded hills and mountains; found in Dominica in the same localities as the *Perdix*, woods sufficiently free from underbrush to afford places for scratching. The places where they have disturbed the earth by scratching are frequently seen in the paths, where the woods are thick, and in the open forest. They will come quickly at

the *call* if within hearing, but are shy, flying cautiously from tree to tree, never long at rest."

2. *Margarops densirostris* (Vieill.).

"'Gros grive.' Very shy.

"Length, ♂, $11\frac{1}{4}$; alar extent, $17\frac{1}{4}$; wing, $5\frac{1}{2}$.

"Length, ♀, $11\frac{1}{4}$; alar extent, $17\frac{1}{4}$; wing, $5\frac{1}{2}$.

3. *Margarops montanus* (Vieill.).

"'Grivette'.

"Length, ♂, 10 in.; alar extent, 15; wing, 5.

"Length, ♀, $9\frac{1}{2}$ in.; alar extent, 15; wing, 5.

"More numerous than the large 'Gros grive'."

4. *Cinclocerthia ruficauda*, Gould.

"'Trembleur.' Not so abundant as in Dominica.

"Length, ♂, 10 in.; alar extent, 13; wing, 4.

"Length, ♀, 10 in.; alar extent, 13; wing, 4."

Fam. TROGLODYTIDÆ.

5. *Thryothorus rufescens*, Lawr.

"Wren."

"Length, ♂, $4\frac{3}{4}$ in.; alar extent, $6\frac{3}{4}$; wing, 2.

"Length, ♀, $4\frac{3}{4}$ in.; alar extent, $6\frac{3}{4}$; wing, 2.

"I found this bird only in the second growth of the hills, and in a wood in the flat portion of the island."

Fam. SYLVICOLIDÆ.

6. *Siurus nævius* (Bodl.).

"Water Wagtail. Rare and shy.

"Length, ♀, 6 in.; alar extent, $9\frac{1}{2}$; wing, 3.

"In the mangroves bordering the Rivière Salée, near Point à Pitre."

7. *Dendroeca petechia* var. *melanoptera*, Lawr.

"'Jaune.' Male.

"Length, ♂, 5 in.; alar extent, 7; wing, $2\frac{1}{4}$; tail, $1\frac{7}{8}$.

"Length, ♀, $4\frac{1}{2}$ in.; alar extent, 7; wing, $2\frac{1}{4}$; tail, $1\frac{7}{8}$.

"More numerous than in Dominica; with the two sparrows the bird most commonly met with in the gardens and coffee plantations. In the latter, I find it chiefly in the pois douce trees, which, originally planted as wind-breaks for the coffee plants' protection, seam the hills all around in long rows. These trees were the haunt of the sparrows in Dominica, and of the warbler that I found there. They bear a pea-like pod, containing seeds surrounded with a sweet pulp, hence their name: pois douce, or sweet bean."

Male: The crown as far as the occiput is of a brownish-rufous; the

upper plumage is greenish-yellow; the middle tail-feathers, the outer webs and ends of inner webs of the others are dark olive, blackish along the shafts; the margins are pale yellow; the inner webs are clear light yellow, except at their ends; wing-coverts black, all margined with pale yellow; tertials and outer webs of the other quills black, inner webs of a lighter shade of black, having a grayish tinge; all the quills are edged with yellow, extending around the tips; under wing-coverts clear light yellow; sides of the head and of the throat light yellowish-rufous; all the under parts clear gamboge-yellow, marked with narrow stripes of dark rufous, except on the lower part of the abdomen and the under tail-coverts; upper mandible dark brown, the under plumbeous; tarsi and toes light hazel.

The female is rather darker above, and is without the rufous crown and longitudinal stripes below; it has the under mandible whitish.

This species most resembles var. *ruficapilla*, Gm., from St. Thomas, St. Croix, &c. Besides the striking feature of its black wings, it differs in being smaller, the wing measuring but two and a quarter inches, which in the other are two and a half; the tarsi and toes are more delicately formed; the tarsus measures $1\frac{1}{8}$ in. against $1\frac{3}{8}$ in. in *ruficapilla*; the rufous streaks below are narrower and darker; the color of the crown is darker than in specimens from St. Thomas and Porto Rico, and the yellow margins of the wing-coverts are not so wide.

In my investigation of this species I find *D. petechia* of my Dominica catalogue to be the same; that island is the nearest south of Guadeloupe, and not very distant. But at a further distance to the north in Antigua and Barbuda, the species of Golden Warbler proves to be var. *ruficapilla*, Gm., as might be expected; agreeing with specimens from St. Thomas and Porto Rico, considered to be the form entitled to that appellation.

In Martinique is found a very different form, viz., *D. rufigula*, Baird; in Barbadoes still another, *D. capitalis*, Lawr.

From St. Vincent and Grenada Mr. Ober sent no Golden Warblers.

8. *Dendroeca plumbea*, Lawr.

"Length, ♂, $5\frac{1}{4}$ in.; alar extent, $7\frac{1}{2}$; wing, $2\frac{1}{2}$.

"Length, ♀, $5\frac{1}{4}$ in.; alar extent, 7; wing, $2\frac{1}{4}$."

9. *Setophaga ruticilla* (Linn.).

"Length, ♂, $5\frac{1}{2}$ in.; alar extent, $7\frac{1}{2}$; wing, $2\frac{1}{2}$.

"Length, ♀, $5\frac{1}{4}$ in.; alar extent, $7\frac{1}{4}$; wing, $2\frac{3}{8}$."

Fam. VIREONIDÆ.

10. *Vireosylvia calidris* var. *dominicana*, Lawr.

"Peow-peow."

"Length, ♂, $6\frac{1}{2}$ in.; alar extent, $9\frac{3}{4}$; wing, $3\frac{1}{4}$.

"Length, ♀, $6\frac{1}{4}$ in.; alar extent, $9\frac{3}{4}$; wing, $3\frac{1}{4}$.

"Known everywhere by its cry; frequenting chiefly trees bearing small seeds."

Fam. HIRUNDINIDÆ.

11. *Hirundo horreorum*, Barton.

Fam. CÆREBIDÆ.

12. *Certhiola dominicana*, Taylor.

"'Sucrier.'

"Length, ♂, 5 in.; alar extent, 8; wing, $2\frac{1}{2}$.

"Not so abundant as in Dominica, where indeed it is more numerous than in any other island. It seems to me that the adult males here are brighter than any I have found elsewhere."

When I examined the collections from Antigua and Barbuda, and determined the species of *Certhiola* from these islands to be *C. dominicana*, I quite forgot Prof. Baird's species *C. frontalis* (N. A. Birds, vol. i, p. 428) from Antigua. Upon a comparison of it now with a large series of *C. dominicana* from Dominica, I find some females precisely like the type of *C. frontalis*. There are specimens of both sexes having their fronts more or less white: it is probably a mark of immaturity. Prof. Baird's name of *frontalis* must therefore become a synonym of *dominicana*.

Fam. TANAGRIDÆ.

13. *Euphonia flavifrons* (Sparm.).

"'La petite Perrouche verte.'"

The subjoined description of the male was given to Mr. Ober when in Guadeloupe by Monsieur Colardeau.

"Length, 5 inches; extent, 8 inches.

"Bill. Short, thick, strong; black above, whitish-blue below; broad, almost triangular, slightly hooked at the end of upper mandible.

"Nostrils. Large, deep seated.

"Head. A beautiful bright yellow spot in front over the nostrils; from this yellow spot, which extends no higher than the eyes, the whole head is of a pretty shade of blue; this coloring extends to the back of the neck, where it curves somewhat towards the throat but not around the neck; the cheeks are bluish olive-green, more yellowish under the throat.

"Back. A uniform bright olive-green, becoming more yellow on the rump.

"Wings. Dusky black, tinged with olive along the outer vanes of quills; wing-coverts olive, streaked with black.

"Belly. Bright yellowish-olive; lighter near vent.

"Tail. Twelve feathers; dusky black tinged with dark olive; short, having two-thirds concealed above and below by feathers of rump and vent.

"Eyes. Black.

"Legs. Short, strong, dirty bluish color.

"Claws. Same color; back claw the strongest.

"Tongue. Short, broad, and thick; split at the end.

"This bird feeds on small, soft, seedy berries; never eats grain or seeds like sparrows or Canary birds. Has no song, except a low chattering when feeding, and a plaintive cry when flying or alighting."

The female has the front of a lighter yellow than the male, and the black border narrower; the blue color on the head is not much different; sides of the head dull light green; upper plumage yellowish-green, gradually becoming more yellow on the rump and upper tail-coverts; throat pale dull yellow; under plumage greenish-yellow.

In pattern of coloration the sexes are alike, but the male can be distinguished from the female by the front being of an orange-yellow, and the black border which entirely surrounds this color being wider; the lores are black; the cheek-patch is deep blackish-green; the back is dark bronze-green; the rump is of a decided yellow, the throat of a clearer yellow, and the under plumage of a much brighter yellow.

This species was found in all the islands visited by Mr. Ober, except Antigua and Barbuda; it would seem not to be abundant in any of them, as in no instance were more than two examples obtained. Though in certain localities it is not uncommon, as Mr. Ober wrote from Guadeloupe that Dr. Colardeau informed him that sometimes it was quite abundant on his estate.

In Mr. Selater's "Synopsis Avium Tanagrinum" (P. Z. S. 1856, p. 271), the male is described as having black upper plumage. I fully expected to receive some from Mr. Ober that were black above, and supposed those marked male to be immature, though in fine condition. I wrote to Mr. Ober, stating that the adult male was said to be black above, and to try and obtain it in that plumage; he replied that he had met with none so marked, and was informed by persons very familiar with the bird—notably Dr. Colardeau—that they had never seen any having black upper plumage.

Mr. Selater (l. c.) is the only one I know of who has described the male; but at that time he considered Desmarest's types (σ and φ) in the Paris Museum (named by Bonaparte *E. selateri*) to be the same as *flavifrons*. *E. selateri* is now known to be a distinct species, and I believe is found only in Porto Rico; the male of this is black above. The male of *E. musica*, from St. Domingo, also has the upper plumage black; both of these have been somewhat mixed up with *E. flavifrons*, which no doubt led to the supposition that the male of that species had the upper plumage black.

An examination of the specimens sent by Mr. Ober from the different islands, together with the assertions of residents, I think, show conclusively that the adults of the two sexes are correctly described above.

Latham's description is supposed to be that of the female; but it is not so stated.

It may have been ascertained that the male of *E. flavifrons* had its upper plumage green; if so, I have never seen it so described.

14. *Saltator guadeloupensis*, Lafr.

"'Grosbee.'

"Length, ♀, 9 in.; alar extent, 13; wing, 4½.

"Not abundant; same habits and frequents same places as that of Martinique and Dominica."

Fam. FRINGILLIDÆ.

15. *Loxigilla noctis* (Linn.).

"'Père noir', ♂. 'Moisson', ♀.

"Length, ♂, 5¼ in.; alar extent, 9; wing, 3.

"Length, ♀, 5½ in.; alar extent, 8¾; wing, 2¾.

"Rather numerous. The female of this species is here called the 'gros bee'; in the other French speaking islands the 'moisson'. In all, however, the 'père noir' is applied to the male. It was a long while before I found out that these two were the same species, they are so dissimilar. The young of the first year resembles the female, as I first surmised in St. Vincent and proved in Dominica."

16. *Phonipara bicolor* (Linn.).

"'Mangeur d'Herbes.'

"Length, ♂, 4¼ in.; alar extent, 6; wing, 2.

"Length, ♀, 4¼ in.; alar extent, 6½; wing, 2."

Fam. ICTERIDÆ.

17. *Quiscalus guadeloupensis*, Lawr.

"'Merle.'

"For a long time, says my friend Monsieur St. Félix Colardeau, these birds might be found on the east bank of the Rivière des Bananiers, and never north of it. This remained a boundary line for many years, but at present the bird is spread over all the lowlands of the island. Very common in the island of Grande Terre, which is flat and low."

Male: The general plumage is of a deep purplish-violet; the wing-coverts have a decided green lustre; tail black, glossed with green; quills black, with a greenish tinge; bill and feet black.

Length (fresh), 10¼ inches; wing, 5; tail, 4; tarsus, 1⅞.

Female: The crown is ashy-brown; hind neck and upper part of back olivaceous-brown; lower part of back and upper tail-coverts blackish-brown; wings and tail black, the latter slightly glossed with green; throat ashy-white, a narrow dusky line extends down on each side of it from the under mandible; lower part of neck and breast dark ash tinged with fulvous; lower part of abdomen, sides, and under tail-coverts smoky-brown; bill and feet black.

Length (fresh), 9½ inches; wing, 4¾; tail, 3½.

At first sight, this species appears much like *Q. inflexirostris* from Martinique, but it is a little larger and the bill is straighter. The

plumage is more violaceous, and the tarsi and toes appear to be stronger than those of that species.

The females differ much in appearance, the female of *Q. inflexirostris* being above of a more decided brown, and having the under plumage grayer; the wings and tail are brown, but the single adult specimen of that species sent has the plumage much worn, which may account for its brown appearance.

From Dominica, intermediate between the habitats of the two forms, no species of *Quiscalus* is recorded.

Fam. TYRANNIDÆ.

18. *Elainea martinica* (Linn.).

"Length, ♂, $6\frac{1}{2}$ in.; alar extent, 10; wing, $3\frac{1}{4}$.

"Length, ♀, 6 in.; alar extent, 9; wing, 3.

"In the oleander and ponne rose hedges near Rivière Ronce, not abundant near Matouba."

Fam. TROCHILIDÆ.

19. *Eulampis jugularis* (Linn.).

"Garnet-throat Hummer.

"With the Violet-breast about equally distributed, almost solely in the mountains. The numerous flowers that are now in bloom attract it, with the other, but it is nowhere so abundant as in Dominica."

20. *Eulampis holosericeus* (Linn.).

"Violet-breast Hummer.

"Length, ♂, $4\frac{1}{2}$ in.; alar extent, $6\frac{1}{4}$; wing, $2\frac{1}{2}$.

"Length, ♀, $3\frac{3}{4}$ in.; alar extent, 6; wing, 2.

"I saw in the Musée at Martinique a humming-bird much resembling this species, with the breast and throat the same, but having the chin for a half inch or so beneath the bill of the same garnet coloring as in the Garnet-throat, just as if a fragment of the gorget of the Garnet-throat had been removed from that bird and attached to this. I really thought it was a manufactured specimen, but a close examination failed to detect any defect. Mr. Belanger said there were others in the garden like it, but I never saw them, though I often hunted there. Mr. Belanger is a good botanist, but nothing of an ornithologist. Since Dr. L'herminier left nothing has been done respecting the birds of the islands. This specimen was a mounted one in a private case in the side building of the garden.

"Dr. Colardeau held that this is none other than the young of *E. jugularis*. He says he has had the young in a nest, and that they were all like this, and that the old female (which came to feed them) was exactly like the highest colored of this species."

21. *Orthorhynchus exilis* (Gm.).

"Length, ♂, $3\frac{1}{2}$ in.; alar extent, 5; wing, 2.

"Length, ♀, $3\frac{1}{2}$ in.; alar extent, $4\frac{1}{2}$; wing, 2.

"As in Dominica, this species is the most abundant and most generally distributed, though, as there, I find it more numerous in the higher hills. It seems to me that both species are here, the *exilis* and *ornatus*, as I have seen several with the darker throat."

Fam. CYPSELIDÆ.

22 *Cypseloides niger* (Gm.).

"Swallow.

"Length, ♂, $6\frac{3}{4}$ in.; alar extent, $15\frac{1}{4}$; wing, 6."

Fam. ALCEDINIDÆ.

23. *Ceryle alcyon* (Linn.).

"Ceryle."

24. *Ceryle torquata* (Linn.).

"This bird appeared in the list given me by Mr. Belanger, of the Jardin des Plantes, Martinique, but I doubted if it was obtained in Guadeloupe. I was assured, however, by Monsieur L. Vitrac, the conservateur of the Musée de L'Herminier, that he had shot that same species here. There are two, a male and a female, in the Musée."

Fam. PICIDÆ.

25. *Melanerpes l'herminieri* (Less.).

"Picus L'herminieri. 'Tappeur.'

"Length, ♂, 11 in.; alar extent, 18; wing, $5\frac{1}{2}$.

"Length, ♀, $10\frac{1}{2}$ in.; alar extent, 17; wing, $5\frac{1}{4}$.

"The only island in which I have seen a Woodpecker of any species."

"This species frequents the hills and mountains; it is not common; in its habits reminding me of the Hairy Woodpecker of the North. Iris reddish-chocolate."

Fam. CUCULIDÆ.

26. *Coccyzus minor* (Gm.).

"'Cuckoo manioc' in all islands.

"The second growth on the hills, where once flourished the coffee-trees, affords a good feeding ground for this species, but it is not abundant in these higher hills. I saw one to-day (Aug. 30) in some high trees, in the mountains, feeding, and occasionally crying out. It is little attracted by my bird call, though manifestly disturbed by it, as I drew it from one tree-top to another, though too high to shoot."

Fam. FALCONIDÆ.

28. *Tinnunculus sparverius* var. *antillarum* (Gm.).

"T. sparverius. 'Gli gli.'

"Length, ♂, 10 in.; alar extent, 18; wing, $6\frac{1}{2}$.

"Length, ♀, 11 in.; alar extent, 21; wing, $7\frac{1}{4}$.

"In Dr. L'Herminier's catalogue as furnished me by M. Belanger of the Jardin des Plantes, Martinique, there are six species of hawks, viz, *Falco peregrinus* (*F. sparverius*, *F. tinnunculus*), *F. columbarius*, *F. cyaneus*, *F. haliaëtus*. The 2nd and 3rd are undoubtedly the same. I have seen the Duck Hawk in the Museum of the Jardin des Plantes, Martinique, and the Pigeon Hawk, but whether they were from that island or not, I cannot tell, neither could M. Belanger, the Directeur, as there were birds from Cayenne as well, and from France. Doubtless, in the 35 years since the collection of Dr. L'Herminier was finished, many changes have taken place in the fauna of the island; that I do not find all found by him is not strange either, as he had the advantage of 30 years' residence in the island. I do not know if any printed list of the birds collected by him is in existence; M. Belanger said not, that this list was from a manuscript list in the Musée."

Fam. PHÆTHONTIDÆ.

28. *Phæthon æthereus* (Linn.).

Fam. ARDEIDÆ.

29. *Butorides virescens* (Linn.).

"Green Heron. 'Chaugh.'

"Abundant in the mangrove swamps."

30. *Nyctiardea violacea* (Linn.).

"N. violaceus."

Fam. COLUMBIDÆ.

31. *Columba corensis*, Gm.

"Ramier.

"Length, ♂, 15 in.; alar extent, 24; wing, 8.

"Not so abundant as in Dominica and Grenada."

32. *Zenaida martinicana*, Bp.

"Tourterelle.

"Found mostly on the Grande Terre, the lowland among the canes and in the mangroves along the rivers where they breed."

33. *Chamæpelina passerina* (Linn.).

"Ortolan.

"Abundant, especially in the mangrove swamps bordering sugar plantations, where it breeds and seeks refuge when disturbed."

34. *Geotrygon mystacea* (Temm.).

"'Perdix croissant.'

"Length, ♂, 11 $\frac{3}{4}$ in.; alar extent, 20; wing, 7.

"This is a Perdix more brilliantly colored than the 'Perdix rouge' and

a trifle larger. It derives its name from a white crescent-shaped stripe under the eye. The feathers of the breast have metallic reflections much different from the *P. rouge*. The iris, too, is blood-red, and there are many material differences which stamp it as a different species altogether. The '*Perdix noir*' is the female of the *P. rouge*, and has peculiarities in common. Whether the males and females of this species differ I cannot tell, having as yet (Sept. 27) no specimens to dissect. I have two *Perdix* on board in a cage in mutilated plumage, which I shall try to carry home alive. At the '*Hotel des Bains*' are eight in beautiful plumage; they take kindly to captivity and thrive. I do not know whether they mate and breed in confinement. They live in the mountains, habits same as the *Perdix rouge*; caught in springes."

Mr. Ober brought three living examples of this species to New York, which he kindly presented to me. One died soon after its arrival, and on examination proved to be a female; there is no noteworthy difference of plumage between this and the male sent in Mr. Ober's collection.

The other two specimens, which from their actions I judge to be male and female, are alike in plumage; for the past three months they have been in the Central Park Menagerie, where they appear to be contented and in good health.

Fam. RALLIDÆ.

35. *Rallus crepitans*, Gm.

"*Rallus*."

36. *Gallinula galeata* (Licht.).

"'*Poule d'eau*.'"

Fam. CHARADRIIDÆ.

37. *Charadrius virginicus*, Borkh.

"*Golden Plover*."

38. *Ægialitis semipalmata* (Bp.).

"*Ring-neck Plover*."

"Length, ♀, 7 in.; alar extent, 15; wing, 5."

"All the Plovers and Sandpipers that visit the Antilles are found here."

Fam. SCOLOPACIDÆ.

39. *Tringa maculata* (Vieill.).

40. *Ereunetes petrificatus* (Ill.).

"*Peep*."

41. *Rhyacophilus solitarius* (Wils.).

"*Sandpiper*."

Fam. LARIDÆ.

42. *Larus atricilla*, Linn.

"Larus."

43. *Sterna maxima*, Bodd.

"Sterna elegans?"

44. *Sterna dougalli*, Mont.

"Mauve à bec noir?"

45. *Sterna fuliginosa* (Gm.).

"Sooty Tern."

In the collection is a full-grown specimen of the young of this species, in dark plumage; it is entirely of a smoky black, with the exception of the inside of the wings and a space on the lower part of the abdomen; the feathers of the back and wings are conspicuously margined with white.

This completes the series of catalogues of the birds ascertained by Mr. Ober to inhabit the islands of the Lesser Antilles visited by him.*

The result has been of very great value, and has contributed much to the knowledge of the ornithology of the islands explored. There was no perfect knowledge of the avifauna of any, and of some we knew absolutely nothing.

Yet the work is incomplete; there are several islands that were not visited, and in some of those explored there are species known to inhabit them that have not been identified.

As so much has been accomplished, it is to be hoped that ere long an investigation of the islands not examined by Mr. Ober will be undertaken.

NEW YORK, December 31, 1878.

**ON TWO FISHES FROM THE BERMUDAS MISTAKENLY DESCRIBED
AS NEW BY DR. GÜNTHER.**

By G. BROWN GOODE.

In the February number of the *Annals and Magazine of Natural History* is published a paper by Dr. Günther, describing two "new" species of fishes from the Bermudas,† collected by Mr. J. Matthew Jones, and which, as a well-merited compliment to the naturalist who has so thoroughly and enthusiastically explored those islands, he has christened *Gerres Jonesii* and *Belone Jonesii*. Strangely enough, both species had

* Those preceding it are as follows: Dominica, p. 48; St. Vincent, 185; Antigua and Barbuda, 232; Grenada, 265; and Martinique, 351.

† On two new Species of Fishes from the Bermudas. <Ann. and Mag. Nat. Hist. (5th series), iii, 1879, [Feb.], pp. 150-151.

previously been described by the writer; the latter under the very same name which is now proposed by Dr. Günther. A detailed description of *Belone Jonesii* was published in October, 1877, in the American Journal of Science and Arts.* Dr. Günther's description of *Belone Jonesii* and my own coincide in all essential details, and, furthermore, I had the opportunity of seeing Mr. Jones's specimens on the day they were collected and before they were put in spirits. My specimens were collected within a few days of the same time, and from the same locality.

Gerres Jonesii, Gthr., is apparently identical with the species described by me in 1874 under the name *Diapterus Lefroyi*,† and subsequently referred to in the Catalogue of the Fishes of the Bermudas‡ as *Eucinostomus Lefroyi*.

This species was discovered in Cuban waters at nearly the same time by Prof. Felipe Poey, and was by him named *Eucinostomus productus*.§

DESCRIPTION OF A SPECIES OF LYCODES (L. TURNERI) FROM ALASKA, BELIEVED TO BE UNDESCRIBED.

By TARLETON H. BEAN.

The first species of the genus *Lycodes* known from the North Pacific is in the United States National Museum, where it was sent by Mr. Lucien M. Turner, who took it at St. Michael's, Alaska, March 28, 1876. There is no record of the depth at which it was taken. The single specimen secured is 330 millimetres (13 English inches) in length, and is well preserved. This is one of six species described as scaleless—*polaris* (Sabine), 1820, length of type 7 English inches; *mucosus*, Rich., 1855, types 7 and 11 inches; *Rossi*, Malmgren, 1864, type 32 millimetres; *gracilis*, M. Sars, 1866, type 43 millimetres; *Sarsii*, Collett, 1871, type 44 millimetres, being the other five. I have brought together *polaris*, *mucosus*, *Verrillii*, and *Turneri* in a table of comparative measurements, so that the relations of the North American species may be seen at a glance. It is difficult to determine the exact relations of all the species of *Lycodes* of the Arctic and Subarctic regions, since nearly half of them were described from small individuals; but, so far as the original descriptions and measurements furnish a guide, *L. Turneri* is quite different from all the rest.

The species is dedicated to Mr. Lucien M. Turner, to whose diligence the Museum is indebted for large and valuable additions to its collections from Alaska.

*A Preliminary Catalogue of the Reptiles, Fishes and Leptocardians of the Bermudas, with Descriptions of four Species of Fishes believed to be new. <Amer. Journ. Sci. and Arts, xiv, 1877, (Oct.), pp. 289-298. (p. 295).

†Amer. Journ. Sci. and Arts, vii, 1874, (Aug.), p. 123.

‡Catalogue of the Fishes of the Bermudas, p. 82.

§Enumeratio Piscium Cubensium. . . . Madrid, 1875-76. p. 55.

DESCRIPTION.—The greatest height of the body is contained $8\frac{1}{2}$ times, and its width just behind the pectorals 9 times, in total length. The greatest circumference equals 3 times the height. The height at the ventrals equals the width immediately behind the pectorals. The height at the vent is contained $10\frac{1}{2}$ times in total length, and the width at the same place is contained $4\frac{1}{5}$ times in the length of the head.

The head is depressed; its greatest width equals $\frac{3}{4}$ of its length, which is contained $4\frac{1}{3}$ times in total length. The distance from the tip of the snout to the nape is nearly equal to the greatest width of the head, or $\frac{1}{5}$ of total length. The distance between the eyes equals $\frac{1}{4}$ of the distance from the snout to the nape. The nostrils are tubular, nearly as far apart as the eyes, and slightly farther from the eyes than from each other. The length of the upper jaw equals half the length of the head, the maxilla extending to the vertical through the hind margin of the orbit. The mandible is twice as long as the snout, and extends beyond the vertical through the hind margin of the orbit. On the intermaxillaries there is one full series of teeth, and in front of these a few smaller teeth form an outer imperfect series. There is a naked space at the symphysis, and the first tooth on each side of this is larger than all the rest. There is one complete series on the mandible, and in front of it, about the symphysis, are two irregular short series. A few teeth are in a cluster on the head of the vomer. The palatines have a short single series. All of the teeth are slender, slightly recurved, and a little worn at the points. The distance from the snout to the orbit is twice the length of the ventral, equals the length of the longest dorsal ray, and $\frac{1}{3}$ of the distance of the ventral from the snout. The long diameter of the eye is contained 9 times in the length of the head.

The distance from the tip of the snout to the beginning of the dorsal is $\frac{1}{4}$ of the total length. The length of the first dorsal ray is contained 5 times, and of the longest $3\frac{2}{5}$ times in the length of the head.

The distance from the tip of the snout to the beginning of the anal is slightly more than $\frac{1}{2}$ of the total length; the vent is in the middle of the total length, immediately behind the third cross-band and under the 21st ray of the dorsal; the distance from the origin of the ventrals to the vent equals twice the length of the pectoral. The first anal ray is contained $5\frac{3}{4}$ times in the length of the head, and the longest, $4\frac{1}{5}$ times.

The extended pectoral reaches the 10th ray of the dorsal; the distance of its base from the snout is contained $4\frac{1}{5}$ times, and its length $6\frac{3}{4}$ times in the total length.

The distance of the ventral from the tip of the snout is 3 times the distance from the snout to the orbit, and is contained $4\frac{4}{5}$ times in the total length. The length of the ventrals is contained $6\frac{1}{4}$ times in the length of the head, and twice in the distance from the tip of the snout to the orbit; they extend to a vertical through the anterior margin of the base of the pectoral.

Radial formula: B. VI; D. (including half of caudal) 85; A. (including half of caudal) 67; P. 18; V. 3.

Color: The ground-color is light umber; abdomen grayish brown; lower parts of head cream. A band of cream on the anal extends from the origin of the rays to about their middle. A crescentic band of the same color, mottled with umber, crosses the nape, and continues behind the pectorals, blending there with the first lateral band. A streak of cream, more or less interrupted by umber, extends backwards from the eye across the cheek, almost to the end of the operculum. Ten bands of cream-color, bordered with dark umber, start from the tips of the dorsal rays and extend into the lower half of the body, becoming wider and somewhat broken below the middle of the body. These cross-bands are located at the second, ninth, seventeenth, twenty-fifth, thirty-fourth, forty-third, fifty-second, sixtieth, sixty-eighth, and seventy-seventh dorsal rays. There is, besides, a very indistinct caudal tip of cream-color.

In the table of proportions appended, a statement appears as to how many times the length of different parts of the body is contained in the total length, or in the length of the head, when that seems more convenient.

Table of Measurements.

	Lycodes mucosus.		L. Verrillii.		L. Turneri.	
Current number of specimen	16,930.		21,013.		21,529.	
Locality	{ Cumberland Gulf.		{ Off Nova Scotia.		{ St. Michael's, Alaska.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Length to end of middle caudal rays	430	-----	127	-----	330	-----
Body:						
Greatest height		*12 $\frac{1}{2}$		8		†12
Greatest width		†11		8		†11
Width at vent		3 $\frac{3}{4}$				5 $\frac{1}{2}$
Height at ventrals		13				11
Height at vent		8 $\frac{7}{10}$				9 $\frac{1}{2}$
Head:						
Greatest length		28		17 $\frac{1}{2}$		23
Distance from snout to nape		20				16
Greatest width		17 $\frac{1}{2}$		11		17
Width of interorbital area		4 $\frac{1}{2}$		4		4
Length of snout		9 $\frac{1}{2}$		6 $\frac{1}{2}$		6 $\frac{1}{2}$
Distance of nostrils from eye		6 $\frac{1}{2}$				
Length of upper jaw		16		8 $\frac{3}{4}$		11 $\frac{1}{2}$
Length of mandible		15				13
Distance from snout to orbit		9 $\frac{1}{2}$				7
Long diameter of eye		2 $\frac{1}{2}$		3		2 $\frac{1}{2}$
Dorsal:						
Distance from snout		31		26		25
Length of first ray		5				4 $\frac{1}{2}$
Length of longest ray		7				7
Anal:						
Distance from snout		55		35 $\frac{1}{2}$		51
Length of first ray		3				4
Length of longest ray		6 $\frac{1}{2}$				5 $\frac{1}{2}$
Pectoral:						
Distance from snout		28 $\frac{1}{2}$		18		24
Length		15		8 $\frac{3}{4}$		15
Ventral:						
Distance from snout		28		16 $\frac{1}{2}$		21
Length		2 $\frac{1}{2}$		1 $\frac{1}{2}$		3 $\frac{1}{2}$
Branchiostegals	VI				VI	
Dorsal	90		92		85	
Anal	71		88		67	
Pectoral	18		15		18	
Ventral	3				3	

* At pectorals.

† Near middle of body.

‡ Behind pectorals.

Table of Proportions of North American Species.

	<i>Lycodespolaris</i> .	<i>L. mucosus</i> .	<i>L. Verrillii</i> .	<i>L. Turneri</i> .
Current number of specimen.....		16,930.	21,013.	21,529.
Locality	{	Cumberland Gulf.	Off Nova Scotia.	St. Michael's, Alaska.
	Times in total length.	Times in total length.	Times in total length.	Times in total length.
Length to end of middle caudal rays..	"7 inches"	430 ^{mm}	127 ^{mm}	330 ^{mm}
Body:				
Greatest height.....		8	12 ⁷ / ₁₀	8 ¹ / ₂
Greatest width.....		9	12 ¹ / ₁₀	9
Width at vent.....		(in head) 8	(in head) 5 ³ / ₂	(in head) 4 ¹ / ₂
Height at ventrals.....		8	13 ¹ / ₂	9
Height at vent.....		11 ¹ / ₂	14 ¹ / ₂	10 ¹ / ₂
Head:				
Greatest length.....		3 ⁴ / ₇	5 ³ / ₂	4 ¹ / ₂
Distance from snout to nape.....		5	8 ¹ / ₂	6
Greatest width.....		5 ⁵ / ₈	9	6
Width of interorbital area.....		(in head) 6	(in head) 4 ³ / ₂	(in head) 5 ² / ₂
Length of snout.....		(in head) 3	(in head) 2 ¹ / ₂	(in head) 3 ¹ / ₂
Distance of nostrils from eye.....		(in head) 4 ¹ / ₃	(in head) 5	(in head) 5
Length of upper jaw.....		(in head) 1 ³ / ₂	(in head) 2	(in head) 2
Length of mandible.....		6 ³ / ₈	12	7 ² / ₂
Distance from snout to orbit.....		10 ¹ / ₂	21	14 ² / ₂
Long diameter of eye.....		(in head) 10 ³ / ₂	(in head) 5 ¹ / ₂	(in head) 9
Dorsal:				
Distance from snout.....		3 ¹ / ₂	4	4
Length of first ray.....		(in head) 5 ³ / ₈	(in head) 5	(in head) 5
Length of longest ray.....		(in head) 4	(in head) 3 ¹ / ₂	(in head) 3 ⁷ / ₂
Anal:				
Distance from snout.....		1 ² / ₁₁	2 ¹ / ₂	2
Length of first ray.....		(in head) 9 ¹ / ₂	(in head) 6 ¹ / ₂	(in head) 5 ² / ₂
Length of longest ray.....		(in head) 4 ³ / ₂	(in head) 4	(in head) 4 ¹ / ₂
Pectoral:				
Distance from snout.....		3 ¹ / ₂	5 ¹ / ₂	4 ¹ / ₂
Length.....	(*)	6 ³ / ₈	11 ¹ / ₂	6 ³ / ₈
Ventral:				
Distance from snout.....		3 ¹ / ₂	6	4 ¹ / ₂
Length.....		(in head) 11	(in head) 11	(in head) 6 ³ / ₈
Scales.....	None.	None.	(†)	None.
Dorsal.....		90	92	85
Anal.....		71	88	67
Pectoral.....	15	18	15	18
Ventral.....	2 spines (?)	3	5	3

* Exceeds twice its breadth.

† Upper part of dorsal and all of anal naked; the rest scaly.

DESCRIPTIONS OF NEW SPECIES AND RACES OF AMERICAN BIRDS,
INCLUDING A SYNOPSIS OF THE GENUS *TYRANNUS*, CUVIER.

By ROBERT RIDGWAY.

I.—Synopsis of the Genus *Tyrannus*, Cuvier.

Genus *TYRANNUS*, Cuvier.

Tyrannus, "CUV., *Léçons Anat. Comp.* 1799, 1800" (Agassiz). Type, *Lanius tyrannus*, Linn. ?—VIEILL., *Ois. Am.* Sept. I, 1807, 73.—SWAINS., *Classif. B.* II, 1837, 225.—(=) BAIRD, *B. N. Am.* 1858, 170.—(>) CABAN. & HEINE, *Mus. Hein.* II, 1859, 79 (restricted to *T. carolinensis*; includes also *Pitangus caudifasciatus*?).—(=) GRAY, *Hand-list*, I, 1869, 364.—(=) B. B. & R., *Hist. N. Am. B.* II, 1874, 314.

"*Drymonax*," GLOGER, 1827" (*Cabanis & Heine*).

"*Myiarchus*," BURM. 1850" (nec Caban. 1844).

- Dioces*, REICHENB., AV. Syst. Nat. 1850, pl. 66, fig. (type, *D. pyrrholema*, Reichenb., = *Tyrannus carolinensis*?; no description!).
- Satellus*, REICHENB., l. c. (type, *Tyrannus vociferans*, Swains.?; no description).
- > *Laphyetes*, REICHENB., l. c.—CABAN. & HEINE, Mus. Hein. II, 1859, 76 (includes *T. melancholicus*, *T. "satrapa"*, *T. apolites*, *T. vociferans*, and *T. verticalis*).
- > *Melittarchus*, CABAN., J. f. O., Nov. 1855, 477 (type, *Tyrannus magnirostris*, D'Orb.; includes also *T. crassirostris* and *T. dominicensis*).—CABAN. & HEINE, Mus. Hein. II, 1859, 80.

GEN. CH.—Tyrant-birds of large, medium, or rather small size, with strong, conical bills, strongly bristled rictus, even, emarginated, or slightly rounded tail, and the ends of the outer primaries abruptly narrowed (except in *T. luggeri*). Crown with a concealed colored crest (red, orange, or yellow); plumage without streaks or bars.

The above brief diagnosis, although imperfect, will suffice to distinguish the members of *Tyrannus* from those of allied genera. *Milvulus* agrees in the attenuation of the outer primaries, the colored crest, and many other features, but the tail is excessively forked, the lateral feathers twice or more as long as the middle pair. *Pitangus* is also quite similar in many respects, but has the bill more elongated, less depressed, the outlines straighter, while there are various other differences. Upon the whole, the genus may be considered quite a natural group.

The species vary among themselves not only in colors, but in other respects also, each one (with a single exception so far as I know*) having its own peculiarities of external form, so that were all identical in coloration they could even then be readily distinguished. Attempts have been made to subdivide the genus, but all have proved unsatisfactory. There is, truly, a vast difference in size and form between the robust, almost gigantic, *T. magnirostris*, and the little *T. aurantio-atrocristatus*; but other species are variously intermediate, so that it seems best to consider the variations of form and size in this genus as of mere specific importance.

Conspectus Tyrannorum.

- A. White beneath, the chest shaded with pale grayish (very faint in *T. magnirostris*).
- a. Tail distinctly emarginate at end. Bill very large, much longer than tarsus (measuring from nostril to tip). Tail not sharply tipped with white (= *Melittarchus*, Cabanis, part).
1. Wing, 5.20-5.30; tail, 4.00-4.25; bill, from nostril, 1.00-1.05, its depth at base .42-.46, width .60-.64; tarsus, .88; middle toe, .72. Grayish brown above, the head blackish snuff-brown. *Hab.*—Cuba; Bahamas.
T. MAGNIROSTRIS.
 2. Wing, 4.70-4.75; tail, 3.85-4.20; bill, from nostril, .92-.95, its depth .34-.40, width .58-.60; tarsus, .70; middle toe, .58-.62. Plumbeous-gray above, the head similar. *Hab.*—Guiana, Trinidad, Isth. Panama (?), and Lesser Antilles..... T. ROSTRATUS.
 3. Wing, 4.45-4.80; tail, 3.50-4.05; bill, from nostril, .75-.82, depth .30-.36, width .47-.55; tarsus, .70-.75; middle toe, .52-.60. Colors of *rostratus*, but somewhat lighter plumbeous above. *Hab.*—West Indies and adjacent coasts..... T. DOMINICENSIS.

**T. rostratus* and *T. dominicensis* are alike in the details of structure.

b. Tail slightly rounded. Bill small, much shorter than tarsus (measuring from nostril to tip). Tail sharply tipped with white (=Tyrannus, as sometimes restricted).

4. Wing, 4.45-4.75; tail, 3.40-3.75; bill, from nostril, .50-.57, depth .24-.27, width .37-.40; tarsus, .70-.78; middle toe, .55-.60. Dark plumbeous above, the head and tail black. *Hab.*—Eastern North America; south to Panama.....T. CAROLINENSIS.

B. Yellow beneath, grayish or whitish anteriorly.

a. End of outer primaries more or less attenuated (=Lophyetes and Satellus, Reichenbach, and Melittarchus, Cabanis, part).

5. Bill excessively stout, all its outlines convex. Tail even or faintly emarginate. Wing, 5.00-5.50; tail, 4.00-4.50; bill, from nostril, .75-.81, breadth .53-.60, depth .38-.43; tarsus, .72-.78; middle toe, .63-.68. Above olivaceous-gray, the wings and tail browner, the head darker; crown-patch lemon-yellow; malar region, chin, and throat white, the jugulum faintly ashy; rest of lower parts sulphur-yellow. *Hab.*—Mexico.

T. CRASSIROSTRIS.

6. Tail decidedly emarginate. Wing, 4.25-4.85; tail, 3.70-4.50; bill, from nostril, .60-.77, breadth .40-.52, depth .24-.35; tarsus, .60-.80; middle toe, .56-.60. Head light ash-gray, lighter beneath, the throat sometimes quite white; back, etc., greenish gray; wings and tail dusky, with lighter edgings; lower parts, including breast, rich lemon- or gamboge-yellow, the breast tinged with olive. *Hab.*—The whole of Tropical America, except West Indies.....T. MELANCHOLICUS.

7. Tail decidedly emarginate. Wing, 4.00; tail, 3.42; culmen, .60; middle toe, .50. Similar to *melancholicus*, but cheeks and throat pure white, the wing-edgings whitish green, instead of light cinereous. *Hab.*—Northern forest-region of Brazil.....T. ALBIGULARIS.

8. Tail decidedly emarginate; wing, 4.00; tail, 3.65; culmen, .65; tarsus, .60; middle toe, .50. Above brown, washed with olive-gray, the back indistinctly spotted with darker. Head cinereous, the feathers of the bright yellow crown-patch tipped with black. Wings and tail brown, the remiges edged with whitish, the outer tail-feathers with rusty. Throat cinereous; breast and belly sulphur-yellow. *Hab.*——?

T. APOLITES.

9. Tail ——? Wing, 4.10; tail, 3.10. Above cinereous, the back suffused with olive; crown-patch yellow; wings and tail black, edged with whitish; upper tail-coverts black, edged with olive. Beneath pale yellow, the throat and fore-neck pure white, the breast washed with gray. *Hab.*—Ecuador.....T. NIVEIGULARIS.

10. Tail even. Wing, 4.75-5.25; tail, 3.65-4.00; bill, from nostril, .50-.55, width .35-.38, depth .25-.28; tarsus, .68-.77; middle toe, .55-.58. Head, breast, and back cinereous, paler beneath, the chin nearly white, the back washed with light olive-green. Wings brownish dusky, indistinctly edged with paler; upper tail-coverts and tail black, the outer pair of rectrices with their outer webs white, in marked contrast. Abdomen, anal region, and crissum sulphur-yellow; lining of wing light grayish yellow. Crown-patch deep orange-red. *Hab.*—Western United States and Western Mexico.....T. VERTICALIS.

11. Tail even. Wing, 5.00-5.40; tail, 3.70-4.20; bill, from nostril, .55-.60, width .35-.45, depth .27; tarsus, .72-.78; middle toe, .55-.60. Head and jugulum deep cinereous, the chin whitish; back and breast olivaceous-gray, lighter beneath. Wings light brownish-gray, with paler edgings. Upper tail-coverts and tail black, the tip of the latter and the outer webs of the lateral rectrices pale grayish, sometimes nearly white. Abdomen, anal region, and crissum sulphur-yellow; lining of the wing sulphur-yellow.

Crown-patch deep orange-red. *Hab.*—Central America, Mexico, and South-western United States; northward along eastern base of Rocky Mountains as far as the 40th parallel; south to Costa Rica. . . . T. VOCIFERANS.

5. End of outer primaries not at all attenuated.

12. Tail even, or very faintly emarginated. Wing, 4.15–4.25; tail, 3.25–3.30; bill, from nostril, .52, width .40, depth .28–.32; tarsus, .75–.80; middle toe, .65. Head dull cinereous, with an indistinct grayish-white streak above the auriculars. Crown-patch pure gamboge-yellow. Throat pure white centrally, streaked with ash-gray laterally and across the jugulum; sides of breast deep olivaceous; rest of lower parts deep gamboge-yellow. Back, scapulars, and rump dull brownish olive-green; wings and tail dull brownish, scarcely edged with paler, except in young. *Hab.*—Guiana (Cayenne and Demerara) T. LUGGERI.

C. Monse-gray beneath.

13. Tail very slightly emarginated. Extreme end of outer primaries abruptly attenuated. Wing, 3.50–4.00; tail, 3.10–3.30; bill, from nostril, .40, breadth .30, depth .20; tarsus, .60; middle toe, .42. Pileum black, with a concealed central patch of gamboge-yellow. Above, dull smoky slate-color, the secondaries narrowly edged with whitish. Lower surface uniform monse-gray. *Hab.*—Bolivia and Eastern Peru.

T. AURANTIO-ATROCRISTATUS.

I.—TYRANNUS MAGNIROSTRIS.

Tyrannus magnirostris, D'ORB., in La Sagra's Cuba, Ois., 1839, pl. 13 (Cuba).—BRYANT, Pr. Boston Soc. IX, 1866, 66 (Inagua, Bahamas).—SCL. & SALV., Nom. Neotr. 1873, 53 (Cuba).

Melittarchus magnirostris, CABAN., J. f. O. 1855, 477; Mus. Hein. II. 1859, 80.—GUNDEL, Report, 1865, 238.

Tyrannus matutinus (part). VIEILL., Enc. Méth. 1823, 850.

"*Muscicapa dictator*, LICHT., in Mus. Berol." (Caban. & Heine).

* SP. CH.—Wings, 5.25–5.30; tail, 4.00–4.25; bill, from nostril, 1.00–1.05, its depth .42–.46, width .60–.64; tarsus, .88; middle toe, .72. Tail slightly emarginated. Five outer primaries attenuated at the end by the abrupt emargination of the inner webs.

Above brownish-slate, becoming much darker (blackish sepia-brown or blackish slate) on the head, the wing-coverts and secondaries broadly bordered with grayish white, the rectrices and wing-coverts tipped with the same; primaries and rectrices brownish dusky, narrowly and indistinctly edged with grayish; concealed crown-patch bright orange-red (the feathers tipped with blackish), surrounded by white, the latter entirely concealed. Lower surface entirely white, the sides and breast washed with a faint (scarcely perceptible) ash-gray shade, the lining of the wings tinged with sulphur-yellow.

The following specimens, in the collection of the National Museum, have been examined:—

34237	♂ ad.	Remedios, Cuba..	Dec., 1873	N. H. Bishop.
.....	— ad.	Bahamas .....	.....	Dr. H. Bryant.
55447½	♂ ad.	Cuba .....	.....	Dr. J. Gundlach.

2.—TYRANNUS ROSTRATUS.

Tyrannus rostratus, SCL., Ibis, Jan., 1864, 87 (Trinidad; Guiana).—TAYLOR, Ibis, 1864, 87 (Trinidad).—SCL. & SALV., P. Z. S. 1864, 361 (Isth. Panama ?); Nom. Neotr. 1873, 53.—SEMPER, P. Z. S. 1871, 272 (Sta. Lucia, W. I.); 1872, 651 (do. — "Pip-erie").—LAWR., Proc. U. S. Nat. Mus. I, 1878, 60 (Dominica), 191 (St. Vincent, common), 234 (Antigua, extremely abundant), 240 (Barbuda, common). "*Tyrannus magnirostris*." SCL., Catal. 1861, 263, No. 1449 (nec D'Orb.).

SP. CH.—Wings, 4.70–4.75; tail, 3.85–4.20; bill, from nostril, .92–.95 depth at base .34–.40, width .58–.60; tarsus, .70; middle toe, .58–.62 *Adult*: Above uniform clear plumbeous, the auriculars darker (nearly black); feathers of the pileum with blackish shaft-streaks, and pure white at the base; a concealed patch of bright orange-red. Wings and tail blackish slate, the larger wing-coverts and secondaries edged with whitish gray; rectrices faintly paler along edges and at extreme tips. Lower parts white, shaded across the breast with pale ash-gray, the sides of the breast strongly of this color; lining of the wing white, the axillars (in some specimens) tinged with sulphur-yellow.

HAB.—Northern coast of South America and the Lesser Antilles.

REMARKS.—This bird so closely resembles *T. dominicensis* in color and form as to suggest the probability of its being a local race of that species. It is proper to state, however, that I have never seen an intermediate specimen, though many of both species have been examined, and the slight difference in coloration (noted under the head of *T. dominicensis* and in the synoptical table), as well as the quite marked difference in size, may be found entirely constant.

3.—TYRANNUS DOMINICENSIS.

Tyrannus dominicensis, BRISS., Orn. II, 1760, 394, pl. 38, fig. 2.—RICH., List, 1837, —.—GOSSE, Birds Jam. 1847, 169.—BAIRD, B. N. Am. 1858, 172 (coast S. Carolina; Florida Keys; West Indies); Cat. N. Am. B. 1859, No. 125.—NEWTON, Ibis, 1859, 146 (St. Croix, W. I.; biogr.).—CASS., Pr. Ac. Nat. Sci. Phil. 1860, 143 (Cartagena, New Granada).—BRYANT, Pr. Boston Soc. 1866, 248 (Porto Rico).—B. B. & R., Hist. N. Am. B. II, 1874, 315, 319, pl. 43, fig. 8 (Cuba, Jamaica, St. Thomas, Santa Cruz, Sombrero, and St. Bartholomew, W. I.; Cartagena, New Granada; Greytown, Nicaragua; Florida Keys; coast of S. Carolina; accidental in Massachusetts).—ALLEN, Bull. Mus. Comp. Zool. II, No. 3, 1871, 300 (St. Augustine, Florida; May, several).

Lanius tyrannus, var. *β. dominicensis*, GMEL., S. N. I, 1788, 203 (ex Buff. Pl. Enl. 537).

Melittarchus dominicensis, CABAN., J. f. O. 1855, 478 (Cuba); Mus. Hein. II, 1853, 80, footnote (Hayti and Cuba).

Muscicapa dominicensis, AUD., Orn. Biog. II, 1834, 392, pl. 46; Birds Am. I, 1840, 201, pl. 55.

Tyrannulus dominicensis, JARD., Contr. Orn. 1850, 67 (Bermudas).

Tyrann titiri, BUFF., Pl. Enl. 537.

Tyrannus griseus, VIEILL., Ois. Am. Sept. I, 1807, 76, pl. 46.—SWAINS., Quart. Jour. Sci. XX, 1826, 276.—GRAY, Gen. I, 1844, 247.—BONAP., Consp. I, 1850, 192.—SCL., Catal. 1861, 236, No. 1450 (Jamaica).—MARCH, P. A. N. S. 1863, 287 (do.)—

TAYLOR, Ibis, 1864, 169 (Porto Rico).—LAWR., Ann. Lye. N. Y. VIII, 1864, 99 (Sombrero); 1865, 183 (Greytown, Nicaragua).—BRYANT, Pr. Boston Soc. 1866, 90 (St. Domingo).

Tyrannus matulinus (part), VIEILL., Enc. Méth. 1823, 850.—D'ORB. in La Sagra's Cuba, Ois. 1839, pl. 14.—GRAY, Gen. I, 1844, 247.

Tyrannus tiviri, TEMM., Tabl. Méth. 1836, 24.

Gray Kingbird, BAIRD, l. c., et Auct.

SP. CH.—Wing, 4.45–4.80; tail, 3.50–4.05; bill, from nostril, .75–.82, depth at base .30–.36, width .47–.55; tarsus, .70–.75; middle toe, .52–.60. *Adult*: Similar to *T. rostratus*, but lighter plumbeous above, and the lining of the wing decidedly yellow. *Young*: No colored patch on the crown; smaller wing-coverts, upper tail-coverts, and rectrices distinctly bordered with pale rusty; lining of wing deep sulphur-yellow, and crissum strongly tinged with the same.

HAB.—West Indies and adjacent coasts of the continent from Florida to New Granada. Accidental as far north along the Atlantic coast of the United States as Massachusetts.

REMARKS.—The specimens in the National Museum Collection represent very nearly the known distribution of the species. Specimens from Greytown, Nicaragua (40438, H. E. Holland), and from Cartagena, New Grenada (17885, A. Schott), are quite indistinguishable from Antillean examples.

4.—TYRANNUS CAROLINENSIS.

Muscicapa corona rubra, CATESB., Carol. I, 1731–48, 55, pl. 55.

Tyrannus, BRISS., Orn. II, 1760, 391.

Lanius tyrannus, LINN., S. N. I, 1758, No. 4; ed. 12, I, 1766, 136 (ex Catesby, l. c.).—LATH., Ind. Orn. I, 1790, 81.

Muscicapa tyrannus, WILS., Am. Orn. I, 1808, 66, pl. 13, fig. 1.—BONAP., Synop. 1828, 66.—NUTT., Man. I, 1832, 265.—AUD., Orn. Biog. I, 1840, 453; V, 1842, 420, pl. 79; Synop. 1839, 40; B. Am. I, 1827–30, 204, pl. 56.—GIRAUD, B. Long I, 1844, 39.

Gobe-mouche de la Caroline, BUFF., Pl. Enl. 676.

Lanius tyrannus, var. *γ. carolinensis*, GMEL., S. N. I, 1788, 302 (ex Pl. Enl. 676).

Tyrannus carolinensis, TEMM., Tabl. Méth. 1836, 24.—BAIRD, B. N. Am. 1858, 171; Cat. N. Am. B. 1859, No. 124.—CABAN. & HEINE, Mus. Hein. II, 1859, 79.—COOP & SUCKL., Pacific R. R. Rep. XII, ii, 1860, 167 (Washington Terr.).—HAYDEN, Rep. 1862, 157.—BLAKIST., Ibis, 1862, 3 (Forks Saskatchewan and Saskatchewan Plains; breeds).—LORD, Pr. Roy. Art. Inst. 1864, 113 (Brit. Columbia).—LAWR., Ann. Lye. N. Y. VIII, 1865, 183 (Greytown, Nicaragua); Bull. U. S. Nat. Mus. No. 4, 1876, 28 (Japan, Isth. Tehuantepec; May).—COOPER, Orn. Cal. I, 1870, 311 (Western records; not in Calif.!).—STEPHENSON, Rep. U. S. Geol. Surv. Terr. 1870, 133 (Colorado).—MERRIAM, ib. 1872, 689.—HOLDEN & AIKEN, Pr. Boston Soc. 1872, 205 (Colorado and Wyoming).—ALLEN, Bull. Mus. Comp. Zool. III, 1872, 179 (Utah and Wyoming).—COUES, Key, 1872, 169; Check List, 1873, No. 242; Birds N. W. 1874, 235.—RIDGW., Pr. Essex Inst. Nov. 1873, 184 (Colorado); ib. Jan. 1875, 17 (Truckee R., W. Nevada), 30 (Salt Lake City, Utah), 33 (Parley's Park, Utah); Field and Forest, June, 1877, 208 (Colorado).—GENTRY, Pr. Phila. Ac. 1874, 103 (habits).—B. B. & R., Hist. N. Am. B. II, 1874, 316, pl. 43, fig. 4.

Muscicapa rer, BARTRAM, Fragments N. II. Penn. 1799, 18.

Tyrannus pipiri, VIEILL., Ois. Am. Sept. I, 1807, 73, pl. 44.—CABAN., J. f. O. 1855, 478 (Cuba).—SCL., Catal. 1862, 236, No. 1451.—GUNDL., Repert. 1865, 239 (Cuba).—SCL. & SALV., P. Z. S. 1866, 189 (Nauta, R. Ucayali, E. Peru! *); 1870, 837 (coast Honduras); Nom. Neotr. 1873, 53 ("Am. centr. et merid. ad Boliviam").—COUES, Proc. Phila. Acad. 1871, 26.

Tyrannus intrepidus, VIEILL., Enc. Méth. III, 1823, 849; Gal. Ois. I, 1824, 214, pl. 133.—SWAINS., Philos. Mag. I, 1827, 368; Quart. Jour. XX, 1826, 274.—Sw. & RICH., F. B. A. II, 1831, 137.—BONAP., Comp. List, 1838, 24.—WOODH., Sitgr. Rep. 1853, 73.—SCL., P. Z. S. 1857, 232; 1858, 302 (Oaxaca); 1859, 383 (Oaxaca; March, February), 439 ("whole of Mexico").—SCL. & SALV., Ibis, 1859, 120 (Guatemala).—MOORE, ib. 55 (Honduras).—SUMICHR., Mem. Bost. Soc. I, 1869, 557 (Vera Cruz).

Myiarchus intrepidus, BURM., Verz. Mus. Hal. p. 46.

Muscicapa animosa, LICHT., Verz. Doubl. 1823, 54.

Tyrannus leucogaster, STEPHENS, Gen. Zool. XIII, ii, 1826, 132.

Tyrannus vicillotii, SWAINS., F. B. A. II, 1831, 138 (based on Vieill., Gal. Ois. pl. 133). *King Bird*; *Bee Bird*; *Bee Martin*, VULG.

SP. CH.—Wing, 4.45–4.75; tail, 3.40–3.75; bill, from nostril, .50–.57, depth at base .24–.27, width .37–.40; tarsus, .70–.78; middle toe, .55–.60. *Adult*: Above black, becoming plumbeous on the back, scapulars, and rump; large wing-coverts and remiges edged with whitish; upper tail-coverts bordered with white, and tail broadly tipped with the same. Below pure white, strongly shaded with ash-gray across the jugulum. Middle of the crown with a concealed patch of bright orange-red. *Young*: Above dusky brownish slate, the wing-coverts bordered with pale fulvous, the remiges with dull whitish; upper tail-coverts bordered with pale rusty; tail tipped with pale fulvous, or brownish white. Beneath as in the adult, but jugulum tinged with pale fulvous. No colored patch on vertex.

HAB.—Temperate North America, except parts of the Pacific and Middle Provinces; Middle America, and Western South America to Bolivia; Cuba and Bahamas.

REMARKS.—No difference is perceptible, either in color or proportions, between specimens from Tropical America and those from the United States, although the former may, perhaps, average a trifle smaller. Western examples are likewise identical with Eastern. The species breeds at least as far south as the Isthmus of Panama, as is evident from young specimens, in first plumage, in the National Collection, from the line of the Panama Railroad.

5.—TYRANNUS CRASSIROSTRIS.

Tyrannus crassirostris, SWAINS., Quart. Journ. Sci. XX, 1826, 278; Philos. Mag. 1827, 363.—SCL., Ibis, 1859, 439 (Mazatlan); Catal. 1861, 236, No. 1448 (Mazatlan, W. Mexico).—SCL. & SALV., Ibis, 1860, 399 (Escuintla).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 28 (Chihuitan, Tehnantepec, and Los Cues, Oaxaca).

* "Indistinguishable from North American specimens." Said to have been seen by D'Orbigny as far South as Sta. Cruz de la Sierra, Bolivia!

Melittarchus crassirostris, CABAN., J. f. O. 1855, 478.—CABAN. & HEINE, Mus. Hein. II, 1859, 80, footnote (Mexico).

Megarhynchus crassirostris, FINSCH, Abh. Nat. Brem. 1870, 329 (Mazatlan).

"*Muscicapa gualdo*, LICHT., in Mus. Berol." (Caban. and Heine).

SP. VII.—Length, about 9.50; extent, 15.50; wing, 5.00–5.50; tail, 4.00–4.50; bill, from nostril, .75–.81, depth at base .38–.43, width .53–.60. Tail even, or very slightly emarginated; two to three outer primaries slightly narrowed at ends, and the edge of the inner web faintly sinuated near the middle. *Adult*: Above, olivaceous-gray, the head darker, approaching sepia-brown, especially on the auriculars; wings and tail darker and more brownish than the back, all the feathers faintly edged with pale brownish. Malar region, chin, and throat pure white; jugulum pale ash-gray, tinged with light yellowish olive laterally and posteriorly; rest of lower parts, including lining of wing, clear, rather pale sulphur-yellow. Crown with a concealed patch of clear lemon-yellow. Bill brownish black; feet deep black; iris brown. *Young*: Head pale ash-gray, tinged with light brown, the lores and auriculars darker; no colored patch on crown; back similar to the head, but tinged with olive-green; wing-feathers distinctly bordered with yellowish white (tinged with pale rusty on the coverts); tail-feathers edged with pale yellowish fulvous, becoming more rusty around the terminal border of the feathers. Lower parts as in the adult, but the abdomen, etc., mixed with patches (new feathers) of bright lemon- or gamboge-yellow.

HAB.—Mexico, including both coasts; north to Orizaba and Mazatlan.

REMARKS.—This very strongly marked species is decidedly the most robust member of the genus, although considerably inferior to *T. magnirostris* in general bulk. The bill is peculiarly stout, being almost as deep as it is wide through the base, all its outlines being more decidedly convex than in any other species.

Following is a list of specimens examined, with measurements:

29401	United States.	♂ ad.	Colima	Jan. —, 1863	5.50	4.50	.78	.60	.38	.78	.68
52807	do	♀ ad.	Mazatlan .....	.....	5.25	4.00	.78	.54	.40	.72	.65
57621	do	♀ ad.	Tehuantepec	Dec. 1, 1868	5.00	4.20	.75	.57	.40	.72	.....
57628	do	— ad.	do	Nov. 24, 1868	5.00	4.10	.81	.60	.43	.78	.65
60066	do	♀ ad.	.....	.....	5.20	4.10	.....	.58	.....	.75	.63
52806	do	♂ ad.	Mazatlan .....	.....	5.45	4.35	.80	.53	.43	.75	.65
.....	B. S.	♂ juv.	Orizaba	July 13, 1866	.....	.....	.....	.....	.....	.....	.....

6.—TYRANNUS MELANCHOLICUS.

c. melancholicus.

Suiriri guaza, AZARA, Apunt. II, 1805, 152, No. 198.

Tyrannus melancholicus, VIEILL., Nouv. Dict. XXXV, 1819, 18 (ex Azara, l. c.); Enc. Méth. II, 1823, 551.—D'ORB. & LAFR., Mag. de Zool. 1837, 44.—D'ORB., Voy. Ois. 1839, 311.—BURM., Th. Bras. II, 1856, 464; Reis. La Plata, II, 1861, 452.—BAIRD, B. N. Am. 1858, 176 (part—not descr.).—SCL., Catal. 1862, 235, No. 1443 (Brazil).—SCL. & SALV., P. Z. S. 1863, 142 (Buenos Ayres); Nom. Neotr. 1873, 53 (part).—EULER, J. f. O. 1867, 227 (Brazil; descr. nesting, etc.).—PELZ., Orn. Bras. 1871, 117 (S. Brazil; numerous localities).

Laphyctes melancholicus, CABAN. & HEINE, Mus. Heine, II, 1859, 76 (Brazil; excl. syn. *albugularis*, Burm.).

Muscicapa despotus, LICHT., Verz. Doubl. 1823, 55.

Muscicapa fuscata, SPIN, Av. Bras. II, 1825, 15, pl. 19.

Tyrannus fuscatus, MAX., Beitr. III, 1831, 884.

Tyrannus crudelis, SWAINS., Quart. Jour. XX, 1826, 275 (Brazil).

β. couchi.

Tyrannus couchi, BAIRD, B. N. Am. 1858, 175 ("Northeastern Mexico to Rio Grande"); ed. 1860, pl. 49, fig. 1; Cat. N. Am. B. 1859, No. 128.—SCL., Ibis, 1859, 439 (Orizaba); Catal. 1862, 235, No. 1445 (Mexico).—DRESSER, Ibis, 1865, 472 (common near Matamoras and Brownsville).

Tyrannus melancholicus var. *couchi*, B. B. & R., Hist. N. Am. B. II, 1874, 329, pl. 43, fig. 7.

Tyrannus melancholicus couchi, COUES & SENNETT, Bull. U. S. Geol. & Geog. Surv. Terr. IV, No. 1, 1878, 31 (Hidalgo, Texas; common).

"*Tyrannus melancholicus*," SCL. & SALV., Ibis, 1859, 121 (Dueñas, Guatemala; descr. eggs); (?) P. Z. S. 1870, 837 (coast Honduras); Nom. Neotr. 1873, 53 (part).—TAYLOR, Ibis, 1860, 113 (Honduras).—OWEN, Ibis, 1861, 63 (San Geronimo, Gnat.; descr. nest).—LAWR., Ann. Lyc. N. Y. IX, 1869, 204 (Yucatan).—SCL., P. Z. S. 1870, 439 (Cordova, Jalapa, and Oaxaca, Mexico; Guatemala).

"*Tyrannus satrapa*" (part), SCL., Catal. 1862, 235, No. 1444 (spec. ex Vera Paz and Orizaba).

Couch's Flycatcher, BAIRD, l. c.

γ. satrapa.

"*Tyrannus melancholicus*," TSCHUDI, Wieg. Archiv, 1844, 12 (?); Faun. Per. Aves, 1844-46, 131 (?).—CABAN., in Schomb. Guiana, III, 1848, 700.—SCL., P. Z. S. 1855, 150 (Bogota); 1856, 141 (David, Chiriqui); 1858, 70, 457; 1859, 55; 1860, 92 (E. Ecuador); 281 (Bahahoyo, Ecuador); 1867, 342 (Lima, Peru).—BAIRD, B. N. Am. 1858, 176 (part; specs. described from "Vera Cruz" and Panama).—SCL. & SALV., P. Z. S. 1864, 360 (Isth. Panama); 1867, 279 (Mosquito coast), 578 (Para), 751 (Huallaga R., E. Peru); 1869, 189 (Nauta, Peru), 598, (Conispata, Peru); Nom. Neotr. 1873, 53 (part).—CASS., Pr. Philad. Ac. 1860, 143, (New Granada).—LAWR., Ann. Lyc. N. Y. VII, 1861, 295 (Panama); IX, 1869, 237 (Puna I., W. Ecuador).—TAYLOR, Ibis, 1864, 87 (Trinidad; Venezuela).—SALVIN, P. Z. S. 1870, 199 (Veragua).—FINSCH, ib. 572 (Trinidad).—WYATT, Ibis, 1871, 334 (New Granada, up to 7,000 feet; iris brown).

Laphyctes satrapa, CABAN. & HEINE, Mus. Hein. II, Oct. 15, 1859, 77 (Guiana; Caracas; ex "*Muscicapa satrapa*, Licht., in Mus. Berol.").—CABAN., J. f. O. 1861, 251.

Tyrannus satrapa, SCL., Catal. 1862, 235, No. 1444 (part; specs. ex Tobago and Sta. Marta and Bogota, New Granada).—SCL. & SALV., P. Z. S. 1864, 360 (Isth. Panama).

"*Tyrannus verticalis*," LÉOT., Ois. Trinidad, 1866, 213 (nec Say).

SP. CHL.—Tail more or less decidedly emarginate (depth of the fork .20-.85 of an inch); five outer primaries more or less narrowed at the ends by the emargination of the inner web (nearly obsolete in some females and in the young). Wing, 4.25-4.85; tail, 3.70-4.50; bill, from nostril, .60-.77, width .40-.52, depth .24-.35; tarsus, .60-.80; middle toe, .50-.60.* Head cinereous, the auriculars perceptibly darker, the malar region, chin, and throat paler (whitish in more northern specimens). Back, scapulars, and sides of the breast greenish cinereous, the green

tinge more decided on the breast from the invasion of the yellow of the abdomen. Wings and tail dusky, with lighter edgings. Lower parts (posterior to the breast) rich lemon-yellow. Bill and feet black. *Adult*: Crown with a central concealed patch of bright orange-red; wing-edgings light cinereous, sometimes (more especially in northern examples) tinged with pale yellow. *Female* smaller than the male, the colored patch on the crown more restricted, the tail less deeply emarginate, the primaries less conspicuously narrowed at ends. *Young*: Crown without colored central patch; wing-edgings pale rusty on all the coverts; upper tail-coverts and rectrices likewise bordered with rusty.

HAB.—The entire Neotropical Region, excepting the West Indian islands; north to Texas (Lower Rio Grande Valley) and Mazatlan; south to Buenos Ayres and Peru.

REMARKS.—In all examples of this species from the South Brazilian Region (embracing, besides Southern Brazil, Paraguay, Bolivia, and Buenos Ayres), the colors are considerably darker than in any from more northern localities, the throat being decidedly cinereous, and the back a quite dark olivaceous gray. This series also averages considerably larger in size, and has the tail more deeply forked. Specimens from northern South America (Amazonian and Columbian districts) show decidedly lighter throats, but are otherwise scarcely different, except in their usually smaller size. To the northward, the tendency to gradually lighter colors increases in direct ratio with the latitude, culminating with the northern limit to the range of the species, in Northern Mexico and the Rio Grande Valley of Texas. Taking examples from the latter region, and comparing them with those from the extreme southern range of the species (Buenos Ayres and contiguous provinces), the difference is quite obvious, although still not conspicuous, even on comparison; but the points given by Professor Baird, in "Birds of North America," for distinguishing his *T. couchi* (the northern form) from true *melancholicus*, are found to hold good. The ample series at hand, however, embracing more than fifty specimens, from every part of the known range of the species, proves beyond question the gradual transition between the extremes, in intermediate localities.

The specimens from northern South America having been named *satrapa* by Cabanis and Heine (Mus. Hein. II, p. 77), this name may be used to characterize an intermediate form showing a tendency in a nearly equal degree toward the distinctive character of both *melancholicus* and *couchi*. It may be observed that while examples of *satrapa* agree best with the northern form in the whiteness of the throat, and with the southern one in the dark shade of the wings and tail, they are, as a rule, much brighter yellow beneath than either. Costa Rican specimens agree more nearly with true *satrapa* than with Mexican examples (*couchi*).

A rather more than ordinary amount of individual variation in this species is shown by the very careful measurements of a large series.

This variation extends to all parts of the external anatomy, and is by no means equally correlated, as specimens having the wing or tail of average length, or even unusually lengthened, may have the bill or the tarsus unusually small, and *vice versa*. The tarsus, in forty-eight specimens, varies from .60 to .80 of an inch,—a variation amounting to nearly one-third of the mean length. The bifurcation of the end of the tail varies even more remarkably, the depth of the fork ranging from .20 to .85 of an inch in specimens having the feathers of this member fully developed and otherwise normal!

In the series under examination there are a few specimens more or less noticeable on account of deviations from the usual coloration in one respect or another. No. 16710, from the Amazon (Lieut. Herndon), has the crown-patch clear yellow instead of orange-red, while the wings are almost devoid of the usual light edgings. The plumage, however, of this specimen is much abraded. Specimen No. 39900, from the headwaters of the Huallaga River, Eastern Peru (W. S. Church), is one of the darkest in the entire series. It agrees almost exactly in colors with No. 55701 from Couchitas, Buenos Ayres; but the sides of the breast are dark greenish slate, quite as dark as the color of the back, in very marked contrast to the much paler yellowish olive of the central portion of the breast. No. 37956, from Merida, Yucatan, an adult male, has the orange-red crown-patch surrounded by a strong suffusion of olive green, like the color of the back. A very highly colored specimen from Costa Rica (No. 33392, J. Carniol) has the two longer lower tail-coverts chiefly dusky, with wide borders of pale yellow.

Autumnal specimens of *couchi* have the conspicuous paler edgings to the wing-feathers strongly suffused with sulphur-yellow, and the back more decidedly green than in summer examples. The single young example of this Northern race (No. 58849, ♂, Tehuantepec, June, 1869; Prof. Sumichrast) differs conspicuously from four individuals of the same age from Bahia, and one from Costa Rica (the latter being exactly like the former), in the borders of the wing-coverts being pale sulphur-yellowish instead of light cinnamon-rusty, and in the more creamy yellow of the lower parts. It is perhaps doubtful, however, whether other examples from Mexico would not agree more closely with Southern ones.

The dimensions vary in this species not only with the individual, but also to a very considerable extent with the locality. Thus, dividing the large series before me into groups representing the several zoo-geographical provinces into which Tropical America is divisible, and taking the average of the several measurements of each, the following is found to be the result:

Zoo-geographical province.	No. of specimens.	Wing.	Tail.	Bill from nostril.	Width of bill at base.	Depth of bill at base.	Tarsus.	Middle toe.	Fork of tail.
Brazilian	7	4.61	4.09	.71	.47	.30	.72	.55	.69
Amazonian (including Guiana)	5	4.48	3.97	.67	.45	.31	.65	.53	.61
Columbian (including Western Ecuador)	14	4.47	4.03	.68	.46	.28	.69	.53	.61
Central American	6	4.67	4.08	.65	.45	.29	.72	.54	.56
Mexican (including Guatemala and Honduras)	15	4.60	4.04	.68	.43	.31	.73	.57	.42

The result would of course be somewhat changed with a different proportion of specimens representing the several regions; but in any case it would probably be shown, that the general dimensions increase in proportion to the distance of the locality from the equator, and that the tail is most deeply emarginated in the most southern examples, becoming gradually less forked toward the northward.

7.—TYRANNUS ALBIGULARIS.

Tyrannus albogularis, BURM., Th. Bras. II, 1856, 465 (northern forest-district of Brazil).—

PELZ., Orn. Bras. 1871, 117 (Goiaz, Cuyaba, Matogrosso, and S. Vicente).

Tyrannus albigularis, FINSCH, P. Z. S. 1870, 572, in text sub *T. melancholicus* (critical).—SCL. & SALV., Nom. Neotr. 1873, 53.

“*Muscicapa albigula*, NATTERER, Catal. Msc.” (*Pelzchn*).

SP. CH.—“Head gray; middle of the crown fire-red; back green; throat white; breast and belly yellow; wings and tail more brownish, the feathers with lighter edges.

“A little smaller than the preceding species [*T. melancholicus*], more slender and of more graceful form, the beak especially. Crown, as far as the eye, and nape light whitish gray, rictal region (“Zügelgegend”) and upper half of the ear-coverts blackish, the cheeks and the lower half of the ear-coverts as well as the throat, pure white. Back and lesser wing-coverts (“Achselfedern”) olive-green, the upper tail-coverts brownish. Wings and tail-feathers grayish brown, the first narrowly edged with whitish green, the latter with rust-yellow, particularly towards the base; the inner edge of the wing of the same color, but broader, wanting on the tail-feathers. Only the three first primaries attenuated and emarginated, but the tip (“Absatz”) much shorter and blunter [than in *T. melancholicus*]. Breast, belly, thighs and anal region lemon-yellow; there is no gray shade on the breast, but the yellow color with greenish tint extends here as far as the neck. Beak and legs blackish brown, iris brown; the beak on the whole smaller, considerably shorter, with a distinct though blunt ridge and moderately convex; . . . the toes longer.

“Total length 8”, culmen 7”, wings 4”, tail in the middle 3”, along the outer feather 3” 4”, commissure 8”, middle toe without claw 6”.

“The species inhabits the northern forest-region of Brazil, near Bahia, and Pernambuco; it entirely resembles the preceding in its habits and

also much in its appearance, so much that it certainly has been confounded with it by most authors."

REMARKS.—Never having seen a specimen referable to this species, I follow Messrs. Selater and Salvin in recognizing it as distinct from *T. melancholicus*, without knowing, however, their grounds for doing so. In his remarks upon *T. melancholicus*, in the "Proceedings" of the Zoological Society of London for 1870, p. 572, Dr. Finsch alludes to *T. albicularis*, as follows:

"In contradiction to the views of Dr. Cabanis, I agree with von Pelzel in considering *T. albicularis*, Burm. (Bras. ii, p. 465), to be specifically distinct from *T. melancholicus*. A specimen from Brazil in the Bremen Museum shows the chin and throat decidedly white; whereas these parts in *T. melancholicus* are whitish gray. Four specimens from Northern Brazil (Ceará) all show this latter character."

Unfortunately, the other distinctive characters of Burmeister's species are not alluded to. That mentioned by Dr. Finsch, *i. e.*, the whiteness of the throat, seems of little account, since, according to the specimens which I have seen from that region, it is customary for *T. melancholicus* from northern South America to have the throat nearly, if not quite, white. The only characters given in Burmeister's description which appear really distinctive are the smaller size and the whitish green instead of pale grayish edgings to the wing-feathers. It is, therefore, solely upon the presumption that Messrs. Selater and Salvin and Dr. Finsch have good reason for considering the species distinct from *melancholicus* that I so here consider it.

8.—TYRANNUS APOLITES.

Laphyetes apolites, CABAN. & HEINE, Mus. Hein. II, Oct. 15, 1859, 77 (*hab. incog.*).

SP. CH.—"Supra plumis dorsalibus fuscis, late olivascence-griseo-limbatis, itaque dorso quasi obsolete maculato; capite cinereo, pilei plumis basi splendide luteis, apice nigris, loris striaque postoculari nigrescentibus; alis caudaque fuscis, remigibus primariis minime, secundariis tectricibusque alaribus albosecente-, rectricibus extus anguste rufescente-marginatis, tectricibus caudæ superioribus fuscis latius rufescente-limbatis; subtus gula cinerascence, pectore abdomineque sulphurescentibus, illo densissime cinerascence adperso; rostro nigro; pedibus fuscis.—Long. tot. 7" 6"', al. 4"', caud. 3" 8"', rostr. culm. 8"', tars. 7"', dig. med. exc. ung. 6'''."

REMARKS.—Although this supposed species is not recognized by Messrs. Selater and Salvin in their *Nomenclator Avium Neotropicalium*, it would seem from the description above quoted, and the remarks which follow (of which a literal translation is given), to be very distinct from any other species of the genus. The black encirclement of the yellow crown, the spotted back, and several other characters mentioned, certainly cannot be reconciled in any other known species.

"A quite typical *Laphyetes*, with strongly forked tail and the characteristic tapering to the points of the five outer primaries; smaller than *L. melancholicus* and *L. satrapa*, hence the smallest known species of the genus. Distinguished by the weaker and shorter beak, the dark encirclement of the vivid yolk-yellow crown, the darker back, appearing peculiarly spotted, and the lighter sulphur-yellow color of the under parts. Unfortunately, the only specimen which has reached us is without any indication of its habitat."

9.—TYRANNUS NIVEIGULARIS.

Tyrannus niveigularis, SCL., P. Z. S. May 22, 1860, 281 (Babahoyo, Ecuador; Mus. P. L. S.—"Irides hazel; bill, legs, and feet black"); Catal. 1861, 237, No. 1452 (Babahoyo).

SP. CH.—"*Supra cinereus, dorso olivaceo perfuso, capitis crista interne flava; loris et regione auriculari nigricante-cinereis: alis nigris, primariis strictis, secundariis et tectricibus late albido limbatis: cauda nigra unicolore, rectricum apicibus et parum externarum marginibus externis rix albicantibus: caudae tectricibus superioribus nigris, olivaceo terminatis: subtus pallide flavus, gutture et collo antico pure albis, hujus lateribus et pectore summo cinereo rix lavatis: rostro et pedibus nigris.*"

"Long. tota 7.0, alae 4.1, caudae 3.1.

"*Hab.* In rep. Equator.

"Mus. P. L. S.

"One ex. "Irides hazel; bill and legs black."

"A species of true *Tyrannus*, looking to its general structure and acuminate primaries, distinguishable by its small size, pure white throat and neck, and black tail. The primaries of the single specimen are not fully developed; but the three first are somewhat obtusely acuminate, quite as much as in *T. melancholicus*."

REMARKS.—From the description above quoted, this species would appear to resemble somewhat the *T. verticalis* of North America; but whether such are its real affinities, its describer does not explain. The description does not state whether the tail is even, emarginated, or rounded,—quite an important question in this connection.

10.—TYRANNUS VERTICALIS.

Tyrannus verticalis, SAY, Long's Exp. II, 1823, 60.—NUTT., Man. II, 1840, 360.—BONAP., Comp. List, 1838, 35; Consp. I, 1859, 192.—BAIRD, B. N. Am. 1858, 173; Cat. N. Am. B. 1859, No. 126.—HEERM., Pacific R. R. Rep. X, 1859, vi, 37.—COOP. & SUCKL., ib. XII, ii, 1860, 168.—SCL., Catal. 1862, 235, No. 1447.—HAYDEN, Rep. 1862, 157.—LORD, Pr. Roy. Art. Inst. IV, 1864, 113 (Brit. Columbia).—BRYANT, Pr. Boston Soc. X, 1865, 96 (Plympton, Maine).—COUES, Pr. Philad. Acad. 1866, 59 (Arizona); Key, 1872, 170; Check List, 1873, No. 241; B. N. W. 1874, 233.—COOPER, Orn. Cal. I, 1870, 312.—STEVENSON, Rep. U. S. Geol. Surv. Terr. 1870, 163 (Colorado).—MERRIAM, ib. 1872,

690.—ALLEN, Bull. M. C. Z. 1872, 179 (Kansas, etc.).—AIKEN, Pr. Boston Soc. 1872, 205.—SCL. & SALV., Nom. Neotr. 1873, 53.—SNOW, B. Kans. 1873, 3 (abundant in E. Kansas!).—B. B. & R., Hist. N. Am. B. II, 1874, 324, pl. 43, fig. 2.—JOUY, Field and Forest, April, 1877, 178 (District Columbia; 1 spec.).—RIDGW., ib. June, 1877, 208 (Colorado).

Muscicapa verticalis, BONAP., Am. Orn. I, 1825, 18, pl. 2, fig. 2; Synop. 1828, 67.—NUTT., Man. 1, 1832, 273.—AUD., Orn. Biog. IV, 1834, 422, pl. 359; Synop. 1839, 39; B. Am. I, 1840, 199, pl. 54.

Laphyetes verticalis, CABAN. & HEINE, Mus. Hein. II, 1859, 77, footnote.

SP. CH.—Wing, 4.75–5.25; tail, 3.65–4.00; bill, from nostril, .50–.55, depth at base .25–.28, width .35–.38; tarsus, .68–.77; middle toe .55–.58. **Adult:** Head, neck, and back bluish ash-gray, paler beneath, the chin and upper part of the throat being nearly white; lores and auriculars darker; back and breast tinged with olive-green, lighter beneath. Wings dusky, the feathers edged with slate-gray, these edgings broader and lighter on the secondaries. Upper tail-coverts and tail deep black, the outer webs of the lateral pair of rectrices yellowish white, in sharp contrast. Lower parts, posterior to the breast, deep sulphur-yellow, paler on the crissum; the lining of the wing strongly tinged with olive-gray. Crown with a concealed patch of bright orange-red or vermilion. **Young:** Head above and back light brownish-gray, the latter strongly tinged with olive-green; superciliary region paler than the crown, in quite marked contrast with the dusky-gray auriculars and lores. Chin, throat, and malar region white, gradually passing into pale brownish gray on the jugulum, the breast similar, but tinged with pale olivaceous; remaining lower parts pale creamy sulphur-yellow. Tail as in the adult; wings dusky, as in the adult, but the feathers widely edged with pale yellowish gray. No colored patch on the crown.

HAB.—The Western Province of North America, straggling occasionally entirely across the Eastern Province: Western Mexico, south to Isthmus of Tehuantepec* and Colima.†

11.—TYRANNUS VOCIFERANS

Tyrannus vociferans, SWAINS., Quart. Jour. XX, 1826, 273 (Mexico); Philos. Mag. I, 1827, 368.—BAIRD, B. N. Am. 1858, 174; Mex. Bound. Surv. II, 1859, pt. ii, 8, pl. 10; Cat. N. Am. B. 1859, No. 127.—SCL., P. Z. S. 1859, 383 (Oaxaca; Feb.); Ibis, 1859, 439 (Oaxaca; Guatemala); Catal. 1862, 235, No. 1446 (Los Nogales, Sonora); P. Z. S. 1864, 176 (City of Mexico).—SCL. & SALV., Ibis, 1859, 120 (Vera Paz, Guatemala); Nom. Neotr. 1873, 53 (Mexico and Guatemala).—COUES, Pr. Philad. Ac. 1866, 59 (Arizona); Key, 1872, 170; Check List, 1873, No. 245; B. N. W. 1874, 238.—COOPER, Orn. Cal. I, 1870, 314 (Southern Cal.; breeding north to Sta. Cruz; wintering north to Los Angeles).—AIKEN, Pr. Boston Soc. 1872, 205 (S. E. Wyoming).—MERRIAM, Rep. U. S. Geol. Surv. Terr. 1872, 690.—SUMICHR., Mem. Boston Soc. I, 1869, 557 (Vera Cruz).—B. B. & R., Hist. N. Am. B. II, 1874, 327, pl. 43, fig. 5.—RIDGW., Bull. Essex Inst. Nov. 1873, 184 (Colorado);

*58,850, ♀ ad., Japana, Tehuantepec, April 29, 1869; F. Sumichrast.

†35,064, ♂ ad., Plains of Colima, October, 1863; J. Xantus.

Field and Forest, June, 1877, 208 (do.).—STREETS, Bull. U. S. Nat. Mus. No. 7, 1877, 12 (St. Tomas Bay, Pacific side, Lower California).

Laphyetes vociferans, CABAN. & HEINE, Mus. Hein. II, 1859, 77 (Mexico).

Tyrannus cassini, LAWR., Ann. Lyc. N. Y. June 3, 1850, 39, pl. 3, fig. 2 (Texas).

"*Muscicapa satelles*, LICHT., in Mus. Berol." (Caban. & Heine).

SP. CH.—Wing, 5.00–5.40; tail, 3.70–4.20; bill, from nostril, .55–.60, depth at base .27, width .35–.45; tarsus, .72–.78; middle toe, .55–.60. Tail even. *Adult*: Head and neck deep plumbeous, somewhat lighter beneath, where passing somewhat abruptly into white on the chin; back, scapulars, and breast grayish olive-green, lighter beneath; remaining lower parts sulphur-yellow, the crissum and lining of the wings paler. Wings light brownish gray, the feathers quite distinctly bordered with grayish white. Upper tail-coverts and tail black, the latter faintly tipped with light brownish gray, the outer web of the lateral pair of rectrices more or less widely edged with the same. Crown with a concealed patch of bright orange-red. Bill and feet black; iris brown. *Young*: Head, neck, back, and breast dull grayish slate, paler on the jugulum, the chin and upper part of the throat whitish, the back tinged with brown; lores and auriculars darker. Wing-coverts bordered with light fulvous or rusty buff. Abdomen, etc., pale creamy sulphur-yellow. No colored patch on the crown.

HAB.—Mexico and Guatemala, extending into the southern part of the Western Province of the United States; along the eastern base of the Rocky Mountains, north to about 41°; along the coast of California, to about 37°; south to Costa Rica.

REMARKS.—Many localities in Mexico (both coasts and interior), Guatemala, and Costa Rica, are represented by specimens in the collection of the National Museum.

12.—TYRANNUS LUGGERI.

Tyrannus luggeri, RIDGW. MS.

SP. CH.—Wing, 4.15–4.25; tail, 2.25–2.30; bill, from nostril, .52, width at base .40, depth, .28–.32; tarsus, .75–.80; middle toe, .65. Tail very slightly emarginate. Ends of primaries not at all attenuated! Above, greenish olive, the wings and tail dusky brownish, the head dark cinereous, with an indistinct grayish streak above the auriculars. Throat pure white, streaked with ash-gray laterally and across the jugulum. Sides of breast deep olivaceous; remaining lower parts, including lining of the wing, bright gamboge-yellow. Bill and feet blackish. *Adult*: Crown with a large concealed patch of bright gamboge-yellow. Wings and tail very faintly edged with lighter brown. *Young*: Crown-patch much restricted (nearly obsolete). All the wing-feathers (coverts and remiges) and rectrices distinctly bordered with light rusty.

HAB.—Guiana (Cayenne, Demerara. Mus. G. N. L. & R. R.).

REMARKS.—With a closer resemblance to *T. melancholicus* than to

any other of the species of this genus with which I have been able to compare it, *Tyrannus luggeri* is, nevertheless, so very distinct as not to need any special comparison. In size and general form it corresponds almost exactly with *T. carolinensis*, while the bill is much more like that of the latter species in size and shape than that of any of the yellow-bellied group. The totally different coloration, however, allies it more closely to the group represented by *T. melancholicus*, while the broad-tipped primaries constitute a feature entirely unique in this genus.

Although it seems rather strange that a new species of this genus should be found in a district so well explored ornithologically as the habitat of the present bird, I have nevertheless been unable to find a description at all applicable to it.

13.—TYRANNUS AURANTIO-ATROCRISTATUS.

Tyrannus aurantio-atrocristatus, LAFR. & D'ORB., Mag. de Zool. 1837, 45 (Bolivia).—D'ORB., Voy. Ois. 1839, 312 (Corrientes, Paraguay; Valle Grande, Bolivia).—BURM., Reise La Plata, II, 1861, 453.—SCL. & SALV., P. Z. S. 1866, 190 (Ucayali, E. Peru); Nom. Neotr., 1873, 53.—HUDSON, P. Z. S. 1870, 113 (Buenos Ayres, rare; Entre Rios).

Tyrannus yvea, LICHT., Nomencl. 1854, 16 (Brazil; Guiana).

Tyrannus inca, SCL., P. Z. S. Nov. 26, 1861, 383 (Bolivia; Mus. P. L. S. et Berol.; ex "Licht. in Mus. Berol."); Catal. 1861, 237, No. 1453 (Bolivia).—PELZ., Orn. Bras. 1871, 118 (Goiáz, Rio Vermelho, Serrado, and Cuyaba).

? *Tyrannus auriflamma*, BURM., J. f. O. July, 1860, 246 (Mendoza).

SP. CH.—Wing, 3.50–4.00; tail, 3.10–3.30; bill, from nostril, .40, width at base .30, depth .20; tarsus, .60; middle toe, .42. Tail even, or (apparently) very slightly emarginated. Extreme end of outer primary attenuated.* Above dull smoky slate, the wings and tail with narrow paler edgings. Below mouse-gray, becoming paler and (in young at least) somewhat tinged with pale sulphur-yellow posteriorly. Bill and feet blackish. *Adult*: Entire pileum black, with a central concealed patch of clear lemon-yellow. *Young*: Pileum smoky brownish slate, like the back.

HAB.—Bolivia (Lafr. & D'Orb.); Paraguay (D'Orb.); Buenos Ayres (Hudson); Brazil (Pelzelin); Pebas, Peru (Mus. Vassar College).

REMARKS.—This very strongly marked species is so very different from the other *Tyranni* in both coloration and the details of external form as to suggest strong doubts of its being properly referable to this genus at all. It surely presents a very great contrast to *T. magnirostris*. There are, however, such variations of form among the spe-

* Dr. Selater, in his description of *Tyrannus inca* (l. c.), says that "the external primaries are acuminate towards the points, the first three being also deeply emarginated 0.4 inch from their extremities." This is very different from the shape of the quills in the single specimen I have been able to examine (an immature female, belonging to the Museum of Vassar College), in which all the quills except the first are very broad at the ends, the first only being emarginated and attenuated at the tip. This discrepancy may, however, be owing to difference of sex or age.

ies usually assigned to this genus, as here restricted, that a further subdivision would necessitate a considerable number of generic groups—almost one for every species—so that, upon the whole, it may be better to leave this species in the genus *Tyrannus*, and consider it as representing the opposite extreme of size and form from *T. magnirostris*.

The above diagnosis is drawn up partly from Dr. Selater's description of the adult as cited, and in part from an immature female in the Museum of Vassar College, Poughkeepsie, N. Y., collected at Pebas, E. Peru, by the late Professor Orton.

II.—*Descriptions of New Races.*

I.—*LICHENOPS PERSPICILLATUS*, β . *ANDINUS*.

Lichenops perspicillatus, β . *andinus*, RIDGW. MS.

CH.—Similar to *L. perspicillatus* (*a. perspicillatus*), but having the white on the primaries restricted to that portion of the quills beyond the sinuation of the outer webs.—*Hab.* Western South America, from Chili to New Granada.

An examination of the series of *Lichenops* in the collection of the National Museum reveals a very marked and constant difference between specimens from Buenos Ayres, Brazil, and Paraguay on the one hand, and those from western South America on the other. In the former, of which there are nine adult males before me, representing the above-named localities, the white patch on the primaries extends anteriorly to the end of the primary-coverts, almost the whole extent of the outer webs of the seven exterior quills being of this color, while the shafts are in some specimens pure white throughout; the latter, however, is by no means usually the case, but, on the contrary, decidedly exceptional. In the Chilian examples, of which there are three adult males, the black at the base of the primaries, which in the Eastern form is wholly concealed by the overlying primary-coverts, extends as far as the sinuation of the edge of the quills, the white being thus restricted to only a little more than half the length of the quills from the ends of the coverts. Only six, instead of seven, of the quills have white on the outer webs; the shafts are black throughout, while the black on the inner web is increased in proportion with that on the outer.

A careful measurement of the whole series gives the following result:

Eastern specimens.

Wing, 3.45–3.65; tail, 2.45–2.70; tarsus, 1.05–1.12.

Western specimens.

Wing, 3.60–3.80; tail, 2.55–2.70; tarsus, 1.05–1.15.*

I am not able to discover any tangible differences between the females of the two races beyond the larger size of the Chilian examples, the

* The minimum is represented by the specimen from Bogota, except in regard to the tarsus, which is shortest in a Chilian example.

measurements of the two series comparing as follows, there being three specimens of each in the collection :

Eastern specimens

Wing, 3.10-3.35; tail, 2.55; tarsus, 1.05-1.10.

Chilian examples

Wing, 3.20-3.25; tail, 2.50-2.70; tarsus, 1.08-1.12.

Following is the principal synonymy of the species :

LICHENOPS PERSPICILLATUS.

. perspicillatus.

Le Clignot, ou Traquet à lunette, BUFF., Hist. Nat. Ois. V, 1806, 234.

Spectacle Warbler, LATH., Synop. II, 2, 1784, 452, No. 50.

Motacilla perspicillata, GMEL., S. N. I, 1783, 939 (quotes Buff. & Lath., ll. cc.).

Sylvia perspicillata, LATH., Ind. Orn. II, 1790, 524.

Enanthe perspicillata, VIEILL., Nouv. Dict. XXI, 1818, 433 (Paraguay).

Ada perspicillata, D'ORB., Voy. Ois. 1839, 339 (Bolivia).

Lichenops perspicillata, DARWIN, Zool. Beag. III, 1841, 51, 52, pl. 9 (La Plata).—
BONAP., Consp. I, 1850, 194 (part; La Plata).—CABAN. & HEINE, Mus. Hein.
II, 1859, 47 (Brazil).—SCL., Catal. 1832, 203, No. 1239 (S. Brazil; Bolivia).—
SCL. & SALV., P. Z. S. 1858, 141 (Buenos Ayres).—HUDSON, P. Z. S. 1869, 432
(do.).—STERNBERG, J. f. O. 1869, 232 (do.).—DURNF., Ibis, 1878, 60 (do.; descr.
nest and eggs).

Fluvicola perspicillata, D'ORB. & LAFR., Mag. de Zool. 1837, 58.—HARTL., Ind.
Azara, 1847, 12, 15.

Suiriri chorreado, AZARA, Apunt. III, 1805, 453, No. 182.

Muscicapa nigricans, VIEILL., Nouv. Dict. XXI, 1818, 454 (Paraguay; ex Vieill., l. c.);
Enc. Méth. 1823, 828.

Elainea nigricans, GRAY, Gen. I, 1849, 251.

Perspicilla leucoptera, SWAINSON, Jardine's Nat. Libr. X, Flycatchers, 1838, 106, pl. 9
(quotes "Azara, III, 453").

Lichenops erythroptera, GOULD, Zool. Beag. III, 1841, 51, 52, pl. 9 (banks of the Plata;
quotes "Swainson's Nat. Libr. X, p. 106").

Ada commersoni, LESS., Traité, I, 1831, 388 (=♂ ad.; Paraguay).

β. andinus.

"*Lichenops perspicillatus*," AUCT. (ex Chili).

2.—DACNIS PULCHERRIMA, *β. AUREINUCHA.*

Dacnis pulcherrima, β. aureinucha, RIDGW. MS.

CH.—Wing, 2.55; tail, 1.60; bill, from nostril, .43; tarsus, .60; middle toe, .50. Similar to *D. pulcherrima*, but bill much longer and less conical; the nuchal crescent deep golden orange, instead of straw-yellow; the chin and throat dull gray, instead of deep black.

Head (except underneath), anterior portion and sides of back, scapulars, and upper tail-coverts deep velvety black; wing-coverts dark ultramarine blue; remiges and rectrices black, edged with dark blue; inner webs of two outer rectrices with a large terminal patch of white.

Middle of the back (longitudinally), whole rump, and entire lower parts pale grayish buff, the abdomen and crissum whitish, the jugulum clearer buff, and the rump decidedly "opalescent." Chin and throat dull gray. Nape crossed by a large crescentic patch of deep golden orange, altogether different in color from the jugulum.

The bill of this race is so very different in form from that of typical *D. pulcherrima*, and more especially from that of the other *Dacni*, as to almost refer it to another genus.

The type-specimen is from Ecuador, and was received from Mr. Bernardo Thiel, through my friend Mr. José C. Zeledon, of Costa Rica.

The differences between this species and its nearest relative, *D. pulcherrima*, may be more precisely expressed as follows:

α. PULCHERRIMA.—Nape bright straw-yellow, not conspicuously different from the color of the jugulum; throat deep black, abruptly contrasted with the buff of the jugulum. Bill moderately elongated, measuring, from the nostril, .30-.37, along the culmen, .15-.50. Wing, 2.60-2.75; tail, 1.65-1.80.—*Hab.*, New Granada to Eastern Peru.*

β. AUREINUCHA.—Nape deep golden orange, totally different in color from the jugulum; throat dull grayish, not abruptly contrasted with the color of the jugulum. Bill much elongated, measuring, from the nostril, .43, along the culmen, .70. Wing, 2.55; tail, 1.60.—*Hab.*, Ecuador.

3.—*PARUS RUFESCENS*, *β. NEGLECTUS*.

Parus rufescens, *β. neglectus*, RIDGW. MS.

Ch.—Similar to typical *rufescens*, but sides grayish, only slightly tinged with rusty, instead of wholly bright chestnut-rufous, or rust-red.

HAB.—Coast of California.

All of the many Californian specimens of this species which have come under my notice agree in the above characters, by which they may be readily distinguished from more northern examples. The typical race extends at least as far south as the Columbia River, Mr. Henshaw having the past summer obtained it along that stream in Northern Oregon. The specimens which he secured show no approach to the Californian form, being quite indistinguishable from Sitkan examples. So far as I have been able to discover, the difference, so far as coloration is concerned, consists solely in that indicated above—the entire sides in true *rufescens* being bright rust-red, or chestnut-rufous, quite as uniform and continuous as that of the back, but lighter. The bill is also decidedly more slender.

* Five specimens measured. The principal synonymy of the typical race is as follows:

DACNIS PULCHERRIMA, *α. PULCHERRIMA*.

Dacnis pulcherrima, SCL., Rev. et Mag. Zool. Oct. 1853, 479 (New Granada); P. Z. S. 1854, 252 (do.); 1855, 84, 137; Catal. 1861, 51, No. 315, pl. 8 (New Granada); Ibis, 1863, 316 (Bogota; monographie).—CASS., Pr. Philad. Acad. 1864, 270.—SCL. & SALV., Nom. Neotr., 1873, 16, No. 9 (Columbia).—BOUC., Cat. Av. 1876, 239, No. 7430.

Nemosia torquata, DU BUS, Bull. Ac. Brux. XXII, 1855, 155.

The principal synonymy of each of the two forms of this species is as follows :

PARUS RUFESCENS.

c. rufescens.

Parus rufescens, TOWNS., Jour. Philad. Acad. 1837, 190 (Columbia River).—AUD., Orn. Biog. IV, 1838, 371, pl. 353; Synop. 1839, 80; B. Am. II, 1841, 158, pl. 129.—BAIRD, B. N. Am. 1858, 394 (part); Cat. N. Am. B. 1859, No. 295; Review, 1864, 83 (part).—COOP. & SUCKL., Pacific R. R. Rep. XII, ii, 1860, 194 (Washington Terr.).—SCL., Catal. 1861, 14, No. 85 (Ft. Steilacoom).—DALL & BANNIST., Tr. Chicago Acad. I, 1839, 280 (Sitka).—COOPER, Am. Nat. 1869, 75 (Montana); Orn. Cal. I, 1870, 47 (part).—COUES, Key, 1872, 81 (part); Check List, 1873, No. 34; B. N. W. 1874, 22 (part).

Pæcile rufescens, BONAP., Consp. I, 1850, 230.

Parus "sitchensis, KITTL." (Gray, Hand-l. I, p. 232).

β. neglectus.

"Parus rufescens," GAMB., Pr. Philad. Acad. 1847, 155 (Monterey, Cal.; abundant).—HEERM., Jour. Philad. Acad. II, 1852, 364 (near San Francisco, June); Pacific R. R. Rep. X, 1859, pt. vi, 42 (California).—CASS., Illustr. B. Cal. Tex. etc. 1853, 18 (part).—BAIRD, B. N. Am. 1858, 394 (part; specs. from California); Review, 1834, 83 (part).—COOPER, Orn. Cal. I, 1870, 47 (part).—BREWST., Bull. Nutt. Orn. Club, Jan. 1878, 20 (deser. young).

A GENERAL CATALOGUE OF THE BIRDS NOTED FROM THE ISLANDS OF THE LESSER ANTILLES VISITED BY MR. FRED. A. OBER; WITH A TABLE SHOWING THEIR DISTRIBUTION, AND THOSE FOUND IN THE UNITED STATES.

By **GEORGE N. LAWRENCE.**

Birds of the Lesser Antilles.		Barbuda.	Antigua.	Guadeloupe.	Dominica.	Martinique.	St. Vincent.	Grenada.	United States.
1	<i>Turdus nigrirostris</i> , Lawr						+	+	
2	<i>Turdus caribbaeus</i> , Lawr							+	
3	<i>Turdus</i> ?								
4	<i>Margarops herminieri</i> (Lafr.)			+	+	+	+		
5	<i>Margarops densirostris</i> (Vieill.)		+	+	+	+	+		
6	<i>Margarops montanus</i> (Vieill.)			+	+	+	+		
7	<i>Ramphocinclus brachyurus</i> (Vieill.)					+			
8	<i>Cinclocerthia ruficauda</i> , Gould	+		+	+	+	+		
9	<i>Cinclocerthia gutturalis</i> , Lafr.					+			
10	<i>Mimus gilvus</i> , Vieill.						+	+	
11	<i>Myiadestes genibarbis</i> , Sw				+	+	+		
12	<i>Myiadestes sibilans</i> , Lawr					+	+		
13	<i>Thryothorus rufescens</i> , Lawr			+	+				
14	<i>Thryothorus musicus</i> , Lawr						+		
15	<i>Thryothorus grenadensis</i> , Lawr							+	
16	<i>Thryothorus martinicensis</i> , Scf.					+			
17	<i>Siurus naevius</i> (Bodd.)		+	+	+				+
18	<i>Siurus motacilla</i> (Vieill.)		+						+
19	<i>Dendroeca virens</i> (Gm.)			+	+				+
20	<i>Dendroeca plumbea</i> , Lawr			+	+				
21	<i>Dendroeca petechia</i> var. <i>ruficapilla</i> (Gm.)	+	+						
22	<i>Dendroeca petechia</i> var. <i>melanoptera</i> , Lawr			+	+				
23	<i>Dendroeca rutigula</i> , Baird					+			
24	<i>Leucopeza bishopi</i> , Lawr						+		
25	<i>Setophaga ruticilla</i> (Linn.)		+	+	+	+	+	+	+
26	<i>Vireosylva calidris</i> (Linn.)		+						
27	<i>Vireosylva calidris</i> var. <i>dominicana</i> , Lawr			+	+	+	+	+	

A Catalogue of the Birds noted from the Islands of the Lesser Antilles, &c.—Continued.

Birds of the Lesser Antilles.		Barbuda.	Antigua.	Guadeloupe.	Dominica.	Martinique.	St. Vincent.	Grenada.	United States.
28	<i>Progne dominicensis</i> (Gm.)	+	+	+	+	+	+	+	+
29	<i>Hirundo horreorum</i> , Barton	+	+	+	+	+	+	+	+
30	<i>Certhiola dominicana</i> , Taylor	+	+	+	+	+	+	+	+
31	<i>Certhiola saccharina</i> , Lawr	+	+	+	+	+	+	+	+
32	<i>Certhiola atrata</i> , Lawr	+	+	+	+	+	+	+	+
33	<i>Certhiola martinicana</i> , Reich	+	+	+	+	+	+	+	+
34	<i>Euphonia flavifrons</i> (Sparm.)	+	+	+	+	+	+	+	+
35	<i>Calliste versicolor</i> , Lawr	+	+	+	+	+	+	+	+
36	<i>Saltator guadeloupcensis</i> , Lafr.	+	+	+	+	+	+	+	+
37	<i>Loxigilla noctis</i> (Linn.)	+	+	+	+	+	+	+	+
38	<i>Phonipara bicolor</i> (Linn.)	+	+	+	+	+	+	+	+
39	<i>Quiscalus lanius</i> , Lawr	+	+	+	+	+	+	+	+
40	<i>Quiscalus inflexirostris</i> , Sw	+	+	+	+	+	+	+	+
41	<i>Quiscalus guadeloupcensis</i> , Lawr	+	+	+	+	+	+	+	+
42	<i>Icterus bonana</i> (Linn.)	+	+	+	+	+	+	+	+
43	<i>Elainea martinica</i> (Linn.)	+	+	+	+	+	+	+	+
44	<i>Myiarchus oberi</i> , Lawr	+	+	+	+	+	+	+	+
45	<i>Myiarchus sclateri</i> , Lawr	+	+	+	+	+	+	+	+
46	<i>Blacicus brunneicapillus</i> , Lawr	+	+	+	+	+	+	+	+
47	<i>Tyrannus rostratus</i> , Sel	+	+	+	+	+	+	+	+
48	<i>Tyrannus melancholicus</i> , Vieill.	+	+	+	+	+	+	+	+
49	<i>Glaucis hirsutus</i> (Gm.)	+	+	+	+	+	+	+	+
50	<i>Eulampis jugularis</i> (Linn.)	+	+	+	+	+	+	+	+
51	<i>Eulampis holosericeus</i> (Linn.)	+	+	+	+	+	+	+	+
52	<i>Thalaurania wagleri</i> (Less.)	+	+	+	+	+	+	+	+
53	<i>Orthorhynchus exilis</i> (Gm.)	+	+	+	+	+	+	+	+
54	<i>Orthorhynchus ornatus</i> , Gould	+	+	+	+	+	+	+	+
55	<i>Orthorhynchus cristatus</i> (Linn.)	+	+	+	+	+	+	+	+
56	<i>Chaetura dominicana</i> , Lawr	+	+	+	+	+	+	+	+
57	<i>Chaetura</i> sp.?	+	+	+	+	+	+	+	+
58	<i>Chaetura</i> sp.?	+	+	+	+	+	+	+	+
59	<i>Swift</i> sp.?	+	+	+	+	+	+	+	+
60	<i>Cypseloides niger</i> (Gm.)	+	+	+	+	+	+	+	+
61	<i>Melanerpes formicivorus</i> (Less.)	+	+	+	+	+	+	+	+
62	<i>Ceryle alcyon</i> (Linn.)	+	+	+	+	+	+	+	+
63	<i>Ceryle torquata</i> (Linn.)	+	+	+	+	+	+	+	+
64	<i>Coccyzus minor</i> (Gm.)	+	+	+	+	+	+	+	+
65	<i>Crotophaga ani</i> , Linn	+	+	+	+	+	+	+	+
66	<i>Chrysotis augusta</i> (Vig.)	+	+	+	+	+	+	+	+
67	<i>Chrysotis guildingi</i> (Vig.)	+	+	+	+	+	+	+	+
68	<i>Parrot</i> sp.?	+	+	+	+	+	+	+	+
69	<i>Strix flammea</i> var. <i>nigrescens</i> , Lawr	+	+	+	+	+	+	+	+
70	<i>Speotyto amaura</i> , Lawr	+	+	+	+	+	+	+	+
71	<i>Pandion haliaetus</i> (Linn.)	+	+	+	+	+	+	+	+
72	<i>Buteo pennsylvanicus</i> (Wils.)	+	+	+	+	+	+	+	+
73	<i>Uribitinga anthracina</i> (Nitzsch.)?	+	+	+	+	+	+	+	+
74	<i>Falco communis</i> var. <i>anatum</i> , Bp.?	+	+	+	+	+	+	+	+
75	<i>Timunculus sparverius</i> var. <i>antillarum</i> (Gm.)	+	+	+	+	+	+	+	+
76	<i>Fregata aquila</i> (Linn.)	+	+	+	+	+	+	+	+
77	<i>Phaethon aethereus</i> (Linn.)	+	+	+	+	+	+	+	+
78	<i>Phaethon flavirostris</i> , Brandt	+	+	+	+	+	+	+	+
79	<i>Pelecanus fuscus</i> (Linn.)	+	+	+	+	+	+	+	+
80	<i>Sula fiber</i> (Linn.)	+	+	+	+	+	+	+	+
81	<i>Ardea herodias</i> , Linn.	+	+	+	+	+	+	+	+
82	<i>Herodias egretta</i> (Gm.)?	+	+	+	+	+	+	+	+
83	<i>Garzetta candidissima</i> (Gm.)	+	+	+	+	+	+	+	+
84	<i>Florida caerules</i> (Linn.)	+	+	+	+	+	+	+	+
85	<i>Eutornis virescens</i> (Linn.)	+	+	+	+	+	+	+	+
86	<i>Nyctiardea violacea</i> (Linn.)	+	+	+	+	+	+	+	+
87	<i>Platalea ajaja</i> (Linn.)	+	+	+	+	+	+	+	+
88	<i>Dasia bahamensis</i> (Linn.)	+	+	+	+	+	+	+	+
89	<i>Clangula clangula</i> (Linn.)	+	+	+	+	+	+	+	+
90	<i>Columba corensis</i> , Gm.	+	+	+	+	+	+	+	+
91	<i>Columba leucocephala</i> , Linn.	+	+	+	+	+	+	+	+
92	<i>Zenaidura martinicana</i> , Bp.	+	+	+	+	+	+	+	+
93	<i>Chamaepelia passerina</i> (Linn.)	+	+	+	+	+	+	+	+
94	<i>Geotrygon montana</i> (Linn.)	+	+	+	+	+	+	+	+
95	<i>Geotrygon mystacea</i> (Temm.)	+	+	+	+	+	+	+	+
96	<i>Numidia meleagris</i> (Linn.)	+	+	+	+	+	+	+	+
97	<i>Ortyx virginianus</i> (Linn.)	+	+	+	+	+	+	+	+
98	<i>Callus crepitans</i> , Gm.	+	+	+	+	+	+	+	+
99	<i>Porzana</i> ?	+	+	+	+	+	+	+	+
100	<i>Porphyrio martinicus</i> (Linn.)	+	+	+	+	+	+	+	+
101	<i>Gallinula galeata</i> (Licht.)	+	+	+	+	+	+	+	+
102	<i>Fulica</i> ?	+	+	+	+	+	+	+	+
103	<i>Squatarola helvetica</i> (Linn.)	+	+	+	+	+	+	+	+

A Catalogue of the Birds noted from the Islands of the Lesser Antilles, &c.—Continued.

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104	<i>Charadrius virginicus</i> , Borkh.	+	+	+	+	+	+	+	+
105	<i>Egialitis semipalmata</i> (Bp.)	+	+	+	+	+	+	+	+
106	<i>Streptopelia interpres</i> (Linn.)	+	+	+	+	+	+	+	+
107	<i>Himantopus nigricollis</i> (Vieill.)	+	+	+	+	+	+	+	+
108	<i>Gallinago wilsoni</i> (Temm.)	+	+	+	+	+	+	+	+
109	<i>Tringa minutilla</i> , Vieill.	+	+	+	+	+	+	+	+
110	<i>Tringa maculata</i> (Vieill.)	+	+	+	+	+	+	+	+
111	<i>Calidris arenaria</i> (Linn.)	+	+	+	+	+	+	+	+
112	<i>Ereunetes petrificatus</i> (Ill.)	+	+	+	+	+	+	+	+
113	<i>Symphemia semipalmata</i> (Gm.)	+	+	+	+	+	+	+	+
114	<i>Gambetta flavipes</i> (Gm.)	+	+	+	+	+	+	+	+
115	<i>Gambetta melanoleuca</i> (Gm.)	+	+	+	+	+	+	+	+
116	<i>Rhyacophilus solitarius</i> (Wils.)	+	+	+	+	+	+	+	+
117	<i>Tringoides macularius</i> (Linn.)	+	+	+	+	+	+	+	+
118	<i>Numenius longirostris</i> (Wils.)	+	+	+	+	+	+	+	+
119	<i>Numenius hudsonicus</i> (Lath.)	+	+	+	+	+	+	+	+
120	<i>Anous stolidus</i> (Linn.)	+	+	+	+	+	+	+	+
121	<i>Sterna maxima</i> , Bodd.	+	+	+	+	+	+	+	+
122	<i>Sterna dougalli</i> , Mont.	+	+	+	+	+	+	+	+
123	<i>Sterna antillarum</i> (Less.)	+	+	+	+	+	+	+	+
124	<i>Sterna fuliginosa</i> (Gm.)	+	+	+	+	+	+	+	+
125	<i>Sterna anæsthesia</i> , Scop.	+	+	+	+	+	+	+	+
126	<i>Larus atricilla</i> (Linn.)	+	+	+	+	+	+	+	+
127	<i>Estrelata</i> ?	+	+	+	+	+	+	+	+
128	<i>Podilymbus podiceps</i> (Linn.)?	+	+	+	+	+	+	+	+

The separate catalogues comprised in the above general one are all published in the "Proceedings of the United States National Museum," Washington, Volume I, that of the Birds of Dominica occupying pp. 46-69; that of St. Vincent, pp. 185-198; those of Antigua and Barbuda, pp. 232-242; that of Grenada, pp. 265-278; that of Martinique, pp. 349-360; that of Guadeloupe, pp. 449-462.

NEW YORK, *March 20, 1879.*

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PROCEEDINGS
OF THE
UNITED STATES NATIONAL MUSEUM.
1879.

NOTES ON THE NESTS AND EGGS OF THE EIGHT NORTH AMERICAN
SPECIES OF EMPIDONACES.

By T. M. BREWER.

In the following paper are given the measurements of all the eggs of the eight species of *Empidonax* that are in the collections of the Smithsonian Institution, and also those in my own, and also a few others. Three of these species, *E. minimus*, *obscurus*, and *hammondi*, so far as is known, have eggs that are uniformly of an unspotted white. If ever spotted, they are so very rarely and so very slightly as hardly to constitute really an exception. In another species, *flaviventris*, of which, so far as I am aware, only five or six well-identified sets have been secured, at least two well-identified sets have been taken that are entirely of an unspotted white color, the others being all more or less spotted and marked. All the remaining four species, *traillii*, *acadiensis*, *pusillus*, and *difficilis*, have eggs strongly marked, though, among them all, eggs are occasionally found that are of an unspotted white, or marked with very minute spottings. In the following brief mention I chiefly confine myself to the size of each egg, its locality, and the authority for its identification, if the record has been preserved.

Empidonax hammondi, Baird.

Four eggs in Museum of Comparative Zoölogy, Cambridge (No. 1681), from Blue River, Colo., Edwin Carter, measure .62 x .52; .60 x .54; .62 x .52; .64 x .53, averaging about .62 x .53.*

T. M. B.'s cabinet No. 1921. Anderson River. MacFarlane. .67 x .52; .68 x .51.

The first set is smaller and more rounded than average eggs of *E. minimus*, but they are otherwise indistinguishable. None are spotted.

Empidonax obscurus, Baird.

Smithsonian No. 15875. Utah. Ridgway. .71 x .55. Ground-color an immaculate dead white.

Smithsonian No. 13592. Austin, Nev. Ridgway. .72 x .55; .74 x .55.

Smithsonian No. 2335. Dodge Valley, Utah. McCarty. .70 x .55; .72 x .54.

* I am indebted for these measurements to Mr. J. A. Allen.

T. M. B. No. 999. Arizona. Dr. Palmer. .76 x .58; .77 x .54.

T. M. B. No. 1760. Utah. Ridgway. .75 x .58; .70 x .54.

Greatest length .77, least .70; greatest breadth .58, least .54. General average of all the examples .73 x .55.

Empidonax difficilis, Baird.

Smithsonian No. 17593. San Francisco, Cal. Samuel Hubbard. .70 x .52; .65 x .50; .68 x .50; average .68 x .51. The ground-color of these three examples is a creamy white, almost a dead white, and they are chiefly spotted around the larger end with markings of a brownish red and a few faint spots of lavender. The color of the markings of this set has no resemblance whatever to those of 13440 (*E. flaviventris*) when carefully compared.

T. M. B. No. 665. Monterey, Cal. Dr. Canfield. .76 x .59; .74 x .59. Spotted with light-brown markings, on a creamy ground, the markings being exclusively around the larger end.

T. M. B. No. 2960. Santa Cruz, Cal. William A. Cooper. The female parent was shot by Mr. Cooper, and was sent to Washington for identification. The nest was in a hollow in a bank, covered with roots and bushes. Incubation just begun, May 4, 1878. .69 x .50; .69 x .51; .70 x .52; .69 x .52. These four eggs, as indeed nearly all of the eggs of this species that I have ever seen, are conspicuously marked with vivid light reddish-brown spots. In three of this set they are chiefly on the larger end; in one the markings are distributed over the whole egg. Ground-color a creamy white.

T. M. B. No. 2959. Nicasio, Marin County, Cal. C. A. Allen. The female parent was shot by Mr. Allen and identified by Mr. Ridgway. .70 x .53; .70 x .54; .65 x .54; .70 x .55. Marked with large bright red-brown spots, chiefly about the larger end. This nest was also built in a cavity.

T. M. B. No. 2728. Santa Cruz, Cal. Geo. H. Ready. Sent me as *E. pusillus*, but evidently a wrong identification. The nest was on a horizontal sycamore limb, ten feet from the ground. .68 x .55; .70 x .57; .70 x .57; .68 x .58.

T. M. B. No. 2890. Haywood, Cal. Dr. J. G. Cooper. May 25, 1877. .70 x .55; .70 x .55; .66 x .55; .68 x .52. The last-mentioned egg is of a very nearly unspotted white.

T. M. B. No. 3053. Santa Cruz, Cal. Geo. H. Ready. April 22, 1877. Nest on the lower limb, at the extremity, of a sycamore, ten feet above the ground. .66 x .52; .65 x .53; .67 x .53. These eggs are, with hardly a doubt, those of *E. difficilis*, though mistaken by Mr. R. for *pusillus*. Their ground-color is pure creamy white. The spots are few, small, and of a more than usually faint brown, disposed in rings around the larger end, the residue of the egg being unspotted.

In 24 examples, the greatest length is .76, least .65, average .69; greatest breadth .59, least .50, average .54.

***Empidonax pusillus*, Cabanis.**

Smithsonian No. 16305. Snake River. Merriam. .76 x .52; .75 x .50.

Smithsonian No. 15210. Parley's Park, Utah. Robt. Ridgway. .77 x .55; .76 x .55; .78 x .57.

Smithsonian No. 15207. From the same. .64 x .49; .70 x .51; .64 x .52.

Smithsonian No. 12982. Sacramento, Cal. Ridgway. .70 x .52; .74 x .55; .70 x .54; .70 x .52.

Smithsonian No. 8543. Vancouver Island. Hepburn. .74 x .55.

T. M. B. No. 960. Northern California. Hepburn. .72 x .58; .73 x .58; .73 x .59.

T. M. B. No. 2119. Lake Koskonong, Wis. Thure Kumlien. Both parents secured. .68 x .52; .71 x .54.

By the kindness of Mr. H. W. Henshaw I am enabled to give the measurements of two sets of eggs taken by him near Honey Lake, Cal., in the summer of 1878, June 25. The first set of three eggs has an unusually pinkish tinge to the cream-colored ground, and around the larger end is a beautiful wreath of markings of a light lilac-brown blending with others of reddish brown. These eggs measure .75 x .55; .74 x .58; .78 x .59.

The other set of four eggs have a nearly pure white ground, and are marked around the wider portion of the egg with small red-brown and a few lilac-brown spottings of a rounded shape. The rest of each egg, including the larger end, has an unspotted surface. One egg has only a very few very fine dottings, and is very nearly pure white. Their measurements are .69 x .55; .68 x .54; .70 x .55; .71 x .58.

All the eggs of this species have a certain family resemblance, which it is easy to recognize at sight, but very difficult to describe distinguishingly. They are all more or less marked with small, rounded spots, rarely blotched, and the markings are, some of them, much more minute than is usual in any other species. The spots are also scattered more about the entire egg, or, if confined, are chiefly on the larger portion of the circumference, and never, or certainly rarely, confluent.

Mr. Henshaw informs me that he has examined at least twenty-five nests of this species (*pusillus*), and that with only one exception they have all been built in willows. The nest before me, taken by Mr. H. near Honey Lake, June 25, 1877, is a well-woven structure, made of thin strips of the inner bark of deciduous trees, broken bits of dry grasses, lichens, &c., and is lined with fine grasses and hair. It is pyramidal in shape, tapering to a point at the base, and is $4\frac{1}{4}$ in external height and $3\frac{1}{4}$ in external breadth. The cavity is two inches deep. It contained the set of four eggs referred to above.

The exception referred to by Mr. Henshaw was a nearly completed nest of this species, found June 17, that was placed in a crotch of a swinging grape-vine. Its structure is said to have been unusually neat and firm for a Flycatcher's. (Wheeler's Report, 1876, p. 255.)

Empidonax traillii, Baird.

Smithsonian No. 4036. East Bethel, Vt. C. Paine. .74 x .52; .74 x .52; .70 x .53; .73 x .52.

Smithsonian No. 7330. Fort Resolution. Lockhart. .80 x .57, .75 x .55; .73 x .55; .72 x .55.

Smithsonian No. 8859. The same. .80 x .55; .80 x .55.

Smithsonian No. 4052. Three Rivers, Canada. Reikoff. .79 x .57.

Smithsonian No. 4395. Great Slave Lake. Lockhart. .79 x .57; .74 x .55.

Smithsonian No. 1229. Williamstown, Mass. Hopkins. .70 x .53; .70 x .55; .72 x .54.

Smithsonian No. 1819. Winnebago, Ill. .70 x .55; .68 x .55. This set is an almost unspotted white.

T. M. B. No. 412. Gorham, N. H. T. M. B. .73 x .49.

T. M. B. No. 413. E. Bethel, Vt. Paine. .76 x .50; .72 x .49.

T. M. B. No. 438. Coventry, Vt. Knight. .70 x .52.

T. M. B. No. 1978. Catskill Mountains, N. Y. Dr. James C. Merrill. .72 x .53; .70 x .52. One of these is very nearly an unspotted white.

T. M. B. No. 1006. Coventry, Vt. .75 x .57.

T. M. B. No. 2632. Milan, N. H. Welch. .79 x .60; .79 x .60.

T. M. B. No. 3054. Randolph, Vt. Prince. .75 x .58; .72 x .55; .73 x .57.

Empidonax flaviventris, Baird.

Smithsonian No. 13219. Halifax, N. S. Downes. Received with parent. .74 x .53. Of a uniform dead chalky white. The other eggs of this set measured .73 x .55 and .75 x .54.

Smithsonian No. 13440. St. Stephen, N. B. Geo. A. Boardman. Parent secured and identification perfect. The nest is small; had been built in a low bush; its breadth internally is 1.90 inches, depth 1.25; external diameter 3 inches, depth 1.75. It is constructed of flax-like fibres, fine shreds of the inner bark of deciduous trees, a few fine grasses mingled with feathers, and lined with horse-hair, downy feathers, and fine grasses. The eggs measure .75 x .54; .75 x .53; .76 x .55. Their original number was four. They have a ground-color of a pure white, with blotch-like spots on the larger end, of purplish drab and umber-brown, mixed with scattered black-markings, but without a tinge of red, and are unlike any other eggs of this genus that I have ever seen.

T. M. B. No. 416. Centre Harbor, N. H. T. M. B. .70 x .56; .74 x .58; .67 x .55. One of these unspotted; two of them marked with small spots of purple drab.

T. M. B. No. 418. Halifax, N. S. Downes. .69 x .55. This egg and the two others in this set were of a nearly pure chalky white, with a few faint spots, so slight as, at first, to be overlooked. The parent secured and sent with the eggs. I exclude from this list the set secured by me in Grand Menan, referred to below, as, although the identifica-

tion was apparently satisfactory, it was not placed beyond doubt by securing the parent. The eggs averaged .68 x .53. Neither in size, shape, nor in the shade of ground-color, did they at all resemble any fresh eggs of *E. minimus* that I have ever seen.

In these ten specimens, the greatest length is .76, the least .67, average .73; the greatest breadth is .58, the least .53, average .55.

Since the above was written, my friend Mr. Wm. A. Jeffries has procured for me, through the courtesy of Mr. Deane, the measurements of the four eggs procured by the latter in Maine, and described by Mr. Purdie. These measure .70 x .55; .70 x .55; .65 x .52; .70 x .55, and reduce the average to .72 x .55. The eggs are described by Mr. Jeffries as of pure white ground, with markings in two eggs of fine dots; in the others, small irregular blotches, of a light red-brown, not so deep or so bright as in *difficilis*; mingled with these are a few markings of lilac. The ground-color appears to have lost the rosy tint mentioned by Mr. P. in the first description, in which, too, no mention is made of the lilac-colored spots.

Through the kindness of Mr. Osborne I have also been enabled to examine one of the eggs contained in the nest of this species found by him in Grand Menan. It measures .70 x .56, and agrees exactly with the description given by him, except that there is a slight roseate tinge in the white ground. The spots are a light reddish brown, and the egg is undistinguishable from several eggs in my collection of *E. difficilis*. It is very different from the eggs identified by Mr. Boardman.

Mr. Osborne writes me that none of this set differ more than $\frac{2}{100}$ in their measurements, and that in their color the only points in which any differ from the one described are the lighter shade of the ground-color and the larger size of the blotches.

Empidonax acadicus, Baird.

Smithsonian No. 10039. Maryland. Slack. .77 x .57.

Smithsonian No. 3430. Marion County, W. Va. Morgan. .67 x .57, .68 x .52; .68 x .55; .75 x .53; .74 x .56; .70 x .56; .67 x .57; .68 x .52; .68 x .55; .75 x .53; .74 x .56; .70 x .56.

Smithsonian No. 2018. Philadelphia. McIlvaine. .76 x .58; .71 x .56.

Smithsonian No. 1959. Locality not given. .75 x .55; .72 x .57.

Smithsonian No. 2128. Northern Georgia. Dr. Gerhard. .77 x .57, .77 x .59.

Smithsonian No. 13470. Locality not given. .76 x .55.

Smithsonian No. 17607. Washington, D. C. H. W. Henshaw. .74 x .54; .70 x .55; .72 x .55.

Smithsonian No. 1681. Halifax, Va. .82 x .55.

T. M. B. No. 2735. Staten Island, N. Y. S. D. Osborne. June 5, 1875. .81 x .60; (nearly unspotted) .80 x .59; .79 x .59.

T. M. B. No. 1010. Indiana. Geo. Welch. .78 x .58; .78 x .60; .77 x .59; .75 x .58.

In these 31 examples the greatest length is .82, the least .67, the mean

.74; the greatest breadth .60, least .52, average .56. The eggs of this species uniformly have a ground-color of a creamy white, or a deep cream-color, and when fresh have a slight roseate tinge. In a few instances the markings are almost, though never wholly, wanting. The eggs of this species so closely resemble those of *trillii* as to be indistinguishable; but they may be readily told from those of *pusillus*.

Empidonax minimus, Baird.

The ground-color of the eggs of this species, as a general rule, is a uniform unspotted white, a creamy white when fresh, fading into a dead white when long exposed to the light and air. In one set of two eggs, both examples are faintly marked with dark or blackish-brown spots. In all the other instances I have seen where eggs of this species seemed to be spotted, the markings have had rather the appearance of stains than genuine natural characters.

Smithsonian No. 3771. Lynn, Mass. Welch. .65 x .48; .66 x .50

Smithsonian No. 12770. E. Windsor Hill, Conn. Dr. Wood. .64 x .48; .65 x .50; .64 x .50; .65 x .50.

Smithsonian No. 8715. The same. .66 x .51; .65 x .50; .67 x .50; .65 x .50; .66 x .53.

Smithsonian No. 16677. Pembina. D. Gunn. .67 x .49; .65 x .50; .66 x .48.

Smithsonian No. 10485. Fort Resolution. Lockhart. .63 x .47; .65 x .50; .65 x .48.

Smithsonian No. 8861. The same. .69 x .50; .69 x .49; .68 x .48.

Smithsonian No. 2193. Randolph, Vt. Paine. .67 x .52.

Smithsonian No. 15030. Racine, Wis. Dr. Hoy. .60 x .50; .61 x .51. Both of these examples are slightly spotted with a very dark or blackish brown.

Smithsonian No. 6212. Fort Resolution. Lockhart. .70 x .52; .65 x .51; .63 x .52; .67 x .52; .67 x .52.

Smithsonian No. ——. Pembina. D. Gunn. .60 x .52; .65 x .51; .63 x .52; .64 x .50.

Smithsonian No. 14562. Lynn. Welch. .62 x .50; .64 x .51; .65 x .49; .65 x .49.

Smithsonian No. 1854. The same. .62 x .52; .65 x .52; .60 x .52.

Smithsonian No. 2985. Sing Sing, N. Y. .64 x .52.

Smithsonian No. 13447. Calais, Me. Boardman. .64 x .52; .65 x .49; .64 x .51; .65 x .48.

Smithsonian No. 1973. Connecticut. Dr. Wood. .62 x .49; .70 x .50; .57 x .48.

Smithsonian No. 4097. Great Slave Lake. Lockhart. .63 x .51; .63 x .50; .65 x .50; .62 x .51.

T. M. B. No. 240. New Britain, Conn. Moore. .60 x .49; .62 x .52.

T. M. B. No. 1262. Lynn. Welch. .64 x .50; .66 x .50.

T. M. B. No. 226. The same. .66 x .52; .65 x .50; .64 x .50; .64 x .50.

T. M. B. No. 3055. E. Bethel, Vt. Prince. .63 x .49; .60 x .50; .59 x .50; .61 x .50; .61 x .50; .65 x .50.

In these 61 examples the extreme length, in two instances, is .70, the least .57, and the mean .64; extreme breadth .52, least .47, mean .50.

RECAPITULATION.

	Extreme length.	Least length.	Mean length.	Extreme breadth.	Least breadth.	Mean breadth.	No. of examples.
<i>Emp. hammondi</i> .....	.68	.60	.64	.54	.51	.52	6
<i>E. obscurus</i> .....	.77	.70	.73	.58	.54	.55	9
<i>E. difficilis</i> .....	.76	.65	.69	.59	.50	.54	24
<i>E. pusillus</i> .....	.78	.64	.72	.59	.49	.55	25
<i>E. trailli</i> .....	.80	.68	.74	.60	.49	.54	31
<i>E. flaviventris</i> .....	.76	.65	.72	.58	.52	.55	15
<i>E. acadicus</i> .....	.82	.67	.74	.60	.52	.56	31
<i>E. minimus</i> .....	.70	.57	.64	.52	.47	.50	61

Mr. S. D. Osborne (B. N. O. C. iii, 187) describes the nest and eggs found in a hummock of moss on the island of Grand Menan, the parent of which was procured, and was by him identified as *E. flaviventris*. "The cavity extended in about two inches, was about four inches in depth, and was lined with a very few fine grasses, black hair-like roots, and skins of berries. The eggs, four in number, are white, with a very delicate creamy tint, which differs in its intensity in the different specimens, and are spotted, mostly at the larger end, with a few dots and blotches of a light reddish shade."

Eight days later than Mr. Osborne's discovery, and in a different locality, Messrs. Deane and Purdie secured another nest and set of eggs, identified as of the same species, in Houlton, Me. This, too, was "in a ball of green moss." "The lining was mainly of fine black rootlets, with a few pine needles and grass stems." "The eggs, four in number, were perfectly fresh, rounded oval in shape, and of a beautiful rosy-white tint, well spotted with a light reddish shade of brown." (B. N. O. C. iii, 166.)

Mr. Osborne remarks that "there are several nests of this bird in different collections, the identities of most, if not all, of which are disputed"; and he adds, "the descriptions given by Baird, Brewer and Ridgway, agree very well with the nests of the Traill's Flycatcher," &c. The first clause is so vague as to make it doubtful to what nests he may refer. So far as I am aware, prior to 1878 only four or five nests of this bird had been procured, and of these three at least are as well and as completely identified as are those of either Mr. Osborne's or Mr. Purdie's. Their authenticity is as indisputable.

Mr. Purdie also assumes, "so great is the variation," "that there was some error of identification"; and finally refers the eggs to the Least Flycatcher, and cites Mr. Ridgway as authority. But Mr. Ridgway, on

the contrary, accepts them as genuine eggs of *flaviventris* in his recent report (p. 544), whatever may be their resemblance to those of *E. minima*; and he so accepts them still.* In fact, there is no more reason why we should reject the identification of these nests and eggs, than for our refusing to credit the statements of Messrs. Osborne, Purdie, and Deane. In either case the identification was complete, and the differences in the nest, if of any real moment, tell as much against the one as the other. Mr. Boardman's and Mr. Downes's birds were submitted to Prof. Baird, and have had his verification in addition.

In June, 1850, I met with a nest which I then had no doubt belonged to this species. It was in a low bush on Grand Menan, near the water. My nephew H. R. Storer, then a lad of sixteen, was with me. Both parents were seen, and the male was carefully observed through a good glass; the female, when first seen, was on the nest; a male, apparently its mate, was near by. Unfortunately, in the attempt to secure one of the parents, it was missed, and the birds became so wild that neither could be secured. We were obliged to leave the island and to take the nest without further identification, but we had no doubt as to the identity. The eggs were white, not cream-color, more oblong and larger than the average eggs of *E. minima*.

A few weeks later, the same year, I received, among other nests and eggs, collected near Halifax by Mr. Andrew Downes, two nests and two sets of eggs, with the parent of each, of *flaviventris*. The parents were sent to Prof. Baird, and by him identified as *E. flaviventris*. There were no notes as to the position of these nests; they were mere collections of broken grasses, and it is not improbable they had been built in hollow places. There was, at least, nothing to show to the contrary. Their authenticity there is no reason to question. The following summer a nest with three eggs and its parent were taken in Centre Harbor, two of the eggs being spotted. The same summer Mr. Boardman procured the nest, four eggs, and the parent bird referred to above as now in the Smithsonian collection. These eggs do not at all correspond, in the color of their markings, to the descriptions given of the sets found in 1878.

Entire reliance cannot be placed upon mere differences in the construction of nests to prove difference of species. However remarkable this may be, it is anything but conclusive. It will be seen that just the same differences are noted in the descriptions of the nesting of *E. difficilis*. While two are noted as built in holes in banks, corresponding with those of the recent examples of *flaviventris*, others were built near the extremities of sycamore limbs ten feet from the ground. Mr. J. A. Allen (B. N. O. C. iii, p. 25) speaks of the *E. acadicus* building a much ruder nest than *E. minimus*, and most probably the specimens before him justified his conclusions; but my experience would lead me to reverse their relative positions. In fact, both of these species vary greatly in their architecture, the Acadian most of all, and no one, but

* But see these Proceedings for 1878, p. 425, footnote.—R. R.

for his positive knowledge of their specific identity, could suppose that a certain flat platform-nest of one pair; the deeply-hollowed nest, with its remarkable border of *chereaux de fris*, of another; and, again, the beautiful pensile nest, like a Vireo's, of a third, were all nests of this same species *acadicus*.

The differences in the color of the eggs identified as those of *flaviventris* are, perhaps, more unusual and remarkable, certainly to their extent. Here are two well-identified sets, those from Halifax, of an unspotted white; another set, but slightly spotted; then Mr. Boardman's set, strongly marked, but very differently from the eggs belonging to the two most recently identified nests. The eggs of *hammondi* and *obscurus* are plain white, and no record exists of any spotted example of either. The same is almost equally true of *minimus*. In sixty-one eggs, only two are found with even faint spots; but this exception may show the possibility of there being more variations than we are now aware of. Among the eggs of *difficilis* a single specimen occurs of very nearly unspotted white. The same is true of one egg of *E. pusillus*. Among the eggs of *E. traillii* unspotted eggs are comparatively more common. Among my eggs of *E. acadicus* there is also one very nearly an unspotted white. So that these variations in nests and in color of eggs cannot be received as necessarily conclusive as against such positive identifications as those of Mr. Boardman's and Mr. Downes's examples.

If we take the product of the average length multiplied by its average breadth at the point of the largest diameter as a proximate test of the relative size of the eggs of each species, we find the following result:

<i>Acadicus</i>	4144
<i>Obscurus</i>	4015
<i>Traillii</i>	3996
<i>Flaviventris</i>	3960
<i>Pusillus</i>	3930
<i>Difficilis</i>	3726
<i>Hammondi</i>	3328
<i>Minimus</i>	3200

Since the above was in type, Mr. Charles A. Allen of Nicasio, California, has furnished me with some very interesting and apposite notes on the nidification of *Empidonax difficilis*, demonstrating the remarkable variations that may exist in regard to the position and structure of the nests of one and the same species of birds. After mentioning that he has taken and identified some forty or fifty nests of this species, he adds:

"I find *E. difficilis* breeding in all situations. Sometimes I find them on the curled root of a tree on the banks of a stream or brook, not over six inches above the water; again I find them in the jagged end of some half-submerged log in mid-stream; again within the loose bark of a tree, no matter what kind, nine or more feet up; again I find them in a

cavity in some decayed tree or limb, or in any kind of depression that gives a base to begin to work on. I also find them in out-houses, or buildings removed from dwellings, on the rafters, or on any spot where they can stick their nest. They are also very common under bridges, and I have found four built in the forks of small trees, some four or five feet up. These were all the same veritable *E. difficilis*."

A LIST OF EUROPEAN FISHES IN THE COLLECTION OF THE
UNITED STATES NATIONAL MUSEUM.

By TARLETON H. BEAN.

About 350 nominal species are mentioned. Since the list is intended simply to facilitate the exchanges between the United States National Museum and museums in Europe, no attempt has been made to distribute the names in accordance with the latest knowledge concerning the classification and specific identity of the species in question. The names given to them by those who presented them are, with few exceptions, retained.

One species (*Gasterosteus Blanchardi*, Sauvage), which was described from specimens sent to Paris from Boston, United States, is referred to *Gasterosteus pungitius*, Linn. (= *Pygosteus occidentalis*, (C. & V.) Breevort), with which it is identical.

The numbers at the left are those of the National Museum Catalogue; those at the right were attached to the fishes when they were received.

Class, PISCES.

Order, PLECTOGNATHI.

Family, TETRODONTIDÆ.

Tetrodon marmoratus, Ranzani.

10208. Canaries. Vienna Museum. (14.)

Family, BALISTIDÆ.

Monacanthus filamentosus, Val.

10217. Canaries. Vienna Museum. (34.)

Order, LOPHOBRANCHII.

Family, HIPPOCAMPIDÆ.

Hippocampus brevisrostris, Cuv.

21122. La Rochelle. Mus. d'Hist. Nat. Paris. (22.)

Hippocampus comes, Cantor.

21163. Madagascar. Mus. d'Hist. Nat. Paris. (63.)

Hippocampus abdominalis, Lesson.

21169. Australia. Mus. d'Hist. Nat. Paris. (69.)

Hippocampus guttulatus, Cuv.

21121. Naples. Mus. d'Hist. Nat. Paris. (21.)

21164. Sicily. Mus. d'Hist. Nat. Paris. (64.)

Family, SYNGNATHIDÆ.

Syngnathus phlegon, Risso.

21124. Nice. Mus. d'Hist. Nat. Paris. (24.)

Syngnathus acus, Linn.

17490. Bergen, Norway. Norwegian Government. (132.)

22022. Christiania, Norway. R. Collett.

22023. Christiania, Norway. R. Collett.

Syngnathus rubescens, Risso.

21123. Nice. Mus. d'Hist. Nat. Paris. (23.)

Syngnathus abaster, Risso.

21113. La Rochelle. Mus. d'Hist. Nat. Paris. (13.)

Syngnathus Agassizii, Michahelles.

21112. Nice, France. Mus. d'Hist. Nat. Paris. (12.)

Syngnathus pelagicus, Linn.

12566. Dr. J. E. Gray. British Museum. (80.)

Siphonostoma typhle, Linn.

12620. Europe.

12520. Europe. (256.)

17489. Bergen, Norway. Norwegian Government. (131.)

21119. France. Mus. d'Hist. Nat. Paris. (19.)

12519. Constantinople.

Siphonostoma Rondeletii, De la Roche.

21118. Marseilles. Mus. d'Hist. Nat. Paris. (18.)

Siphonostoma pyrois, Risso.

6056. Europe.

Nerophis æquoreus, Linn.

17491. Bergen, Norway. Norwegian Government. (133.)

22019. ♂. ♀. Stavanger, Norway. R. Collett.

Nerophis ophidion, Linn.

21114. Algeria. Mus. d'Hist. Nat. Paris. (14.)

22020. Christiania, Norway. R. Collett.

Nerophis papacinus, Risso.

2969. Europe. Bonaparte Collection. (258.)

Nerophis teres, Rathke.

21116. Crimea. Mus. d'Hist. Nat. Paris. (16.)

Nerophis lumbriciformis, (Willughby) Kröyer.

21115. La Rochelle. Mus. d'Hist. Nat. Paris. (15.)

22024. ("Scyphius lumbriciformis, (Willughby) Nilss.") Stavan-
ger, Norway. R. Collett.

Nerophis annulatus, (Risso) Günth.

21117. Nice. Mus. d'Hist. Nat. Paris. (17.)

Order, PEDICULATI.

Family, LOPHIIDÆ.

Lophius budegassa, Spinola.

12683. Europe. Bonaparte Collection.

Order, TELEOCEPHALI.

Family, SOLEIDÆ.

Solea vulgaris, Quensel.

12514. Cast. London, England.

21177. France. Mus. d'Hist. Nat. Paris. (77.)

17324. Helsingburg, Sweden. Swedish Centennial Commission.
(38.)

22033. Christiania, Norway. R. Collett.

17354. Bergen, Norway. Norwegian Government. (87.)

5913. Locality unknown.

Solea ocellata, Linn.

10204. Canaries. (44.)

Solea lascaris, Risso.

10091. Europe. Bonaparte Collection. (17?)

Solea lutea, Risso.

10067. Europe. L. Agassiz.

Ammopleurops lacteus, (Bon.) Günth.

10092. Europe. Bonaparte Collection.

Microchirus linguatula, (Thompson).

10070. Europe. Bonaparte Collection. (36.)

Family, PLEURONECTIDÆ.

Pleuronectes platessa, Linn.

21175. France. Mus. d'Hist. Nat. Paris. (75.)

10061. Christiania, Norway. R. Collett.

22028. Nordland, Norway. R. Collett.
 17360. Bergen, Norway. Norwegian Government.
 17316. Helsingburg, Sweden. Swedish Centennial Commission.
 (31.)
 10029. Kiel Bay. Dr. Möbius.

Pleuronectes limanda, Linn.

17357. Bergen, Norway. Norwegian Government. (84.)
 22030. Christiania, Norway. R. Collett.
 22031. Young. Christiania, Norway. R. Collett.
 17337. Helsingburg, Sweden. Swedish Centennial Commission.
 (34.)
 22087. Christiania, Norway. R. Collett.
 10036. Norway. R. Collett.
 21174. ("*Pleuronectes flesus*.") France. Mus. d'Hist. Nat. Paris.
 (74.)

Hippoglossoides limandoides, (Bloch) Günth.

10032. ("*Pleuronectes limandoides*, Bloch.") Norway. R. Collett.
 22034. Lofoten, Norway. R. Collett.

Pleuronectes Boscii, Risso.

10085. Europe. Bonaparte Collection. (9.)

Pleuronectes microcephalus, Donov.

17290. Helsingburg, Sweden. Swedish Centennial Commission.
 (30.)
 17359. Bergen, Norway. Norwegian Government. (82.)
 17358. Bergen, Norway. Norwegian Government.

Pleuronectes cynoglossus, Linn.

17320. Helsingburg, Sweden. Swedish Centennial Commission.
 (33.)
 17355. Christiania, Norway. Norwegian Government. (86.)
 10068. Europe. L. Agassiz.

Pleuronectes flesus, Linn.

17323. Sweden. Swedish Centennial Commission. (32.)
 22029. Young. Christiania, Norway. R. Collett.
 10031. Norway. R. Collett.
 17356. Bergen, Norway. Norwegian Government. (85.)
 10028. ("*Platessa flesus*.") Kiel Bay. Dr. Möbius.

Platessa passer, Bon.

10069. Europe. Bonaparte Collection. (12.)

Hippoglossus vulgaris, Flem.

17308. Helsingburg, Sweden. Swedish Centennial Commission.
(35.)

17363. Bergen, Norway. Norwegian Government. (76.)

Rhombus maximus, Linn.

16771. England. Liverpool Free Public Museum.

17332. Helsingburg, Sweden. Swedish Centennial Commission.
(36.)

22032. Christiania, Norway. R. Collett.

Rhombus lævis, Rondel.

22182. France. Mus. d'Hist. Nat. Paris. (82.)

16772. England. Liverpool Free Public Museum.

10084. Europe. Bonaparte Collection. (11.)

12512. London, Eng. (174.)

Phrynorhombus unimaculatus, (Risso) Günth.

10066. Europe?

Zeugopterus punctatus, (Bloch) Gottsche.

17361. Bergen, Norway. Norwegian Government. (80.)

Zeugopterus megastomus, (Donov.) Gottsche.

17362. Bergen, Norway. Norwegian Government. (78.)

Zeugopterus norvegicus, Günth.

22035. Christiania, Norway. R. Collett.

Rhomboidichthys podas, (De la Roche) Bleek.

10086. ("Bothus rhomboides.") Bonaparte Collection. (15.)

Rhomboidichthys mancus, (Risso) Günth.

6514. Madeira. Wm. Stimpson.

Family, MACRURIDÆ.

Macrurus rupestris, Bloch.

8571. Europe. Bonaparte Collection.

Macrurus norvegicus, Nilss.

17364. Bergen, Norway. Norwegian Government. (75.)

Family, FIERASFERIDÆ.

Fierasfer imberbis, Cuv.

10165. Europe. Bonaparte Collection. (358.)

Family, OPHIDIIDÆ.

Ophidium barbatum, Linn. *pars*.

3562. Europe?

Ophidium Vasalli, Risso.

2920. Europe. Bonaparte Collection. (484.)

Family, RANICEPTIDÆ.

Raniceps niger, Nilss.

17367. Bergen, Norway. Norwegian Government. (72.)

10056. Christiania, Norway. R. Collett.

10238. Bergen, Norway. (138.)

Family, GADIDÆ.

Gadus poutassou, Risso.

17379. Bergen, Norway. Norwegian Government. (61.)

17378. Bergen, Norway. Norwegian Government. (67.)

Gadus morrhua, Linn.

17388. Ova. Lofoten, Norway. G. O. Sars. (52.)

9561. Ova in various stages of development. G. O. Sars.

9562. Young recently hatched. G. O. Sars.

9564. Two weeks old. G. O. Sars.

9563. One month old, collected on surface of sea.

17390. About 1½ months. Lofoten, Norway. G. O. Sars. (50.)

17391. About two months old. Lofoten, Norway. G. O. Sars. (49.)

17392. Two months old. Lofoten, Norway. G. O. Sars. (48.)

17393. Two and one-half months. Lofoten, Norway. G. O. Sars.
(47.)

17395. Three months. Lofoten, Norway. G. O. Sars. (45.)

17394. Three months. Lofoten, Norway. G. O. Sars. (46.)

17396. Four months. Lofoten, Norway. G. O. Sars. (44.)

9568. Four or five months. Norway. G. O. Sars.

17397. Four or five months. Lofoten, Norway. G. O. Sars. (43.)

17398. About five months. Lofoten, Norway. G. O. Sars. (42.)

17400. Five to six months. Lofoten, Norway. G. O. Sars. (40.)

17399. Five to six months. Lofoten, Norway. G. O. Sars. (41.)

9569. Nearly six months, near shore. Lofoten, Norway. G. O.
Sars.

17401. About six months. Lofoten, Norway. G. O. Sars. (39.)

17402. Six months. Lofoten, Norway. G. O. Sars. (38.)

17403. Eight to nine months. Lofoten, Norway. G. O. Sars. (37.)

17404. Ten to eleven months. Lofoten, Norway. G. O. Sars. (36.)

17405. One year. Lofoten, Norway. G. O. Sars. (35.)

17389. Young. Lofoten, Norway. G. O. Sars. (51.)

22052. Lofoten, Norway. R. Collett.

22053. Christiania, Norway. R. Collett.

16770. England. Liverpool Free Public Museum.

10105. Kiel Bay.

10036. Norway. R. Collett.

17406. Bergen, Norway. Norwegian Government. (34.)
 17407. Bergen, Norway. Norwegian Government. (33.)
 17503. (Stuffed.) Bergen, Norway. Norwegian Government.
 17352. ("*Gadus callarias*, L.") Bohuslän, Sweden. Swedish Centennial Commission. (23.)
 17305. ("*Gadus callarias*, L.") Baltic, Sweden. Swedish Centennial Commission. (24.)

Gadus aeglefinus, Linn.

17387. Young. Bergen, Norway. G. O. Sars. (53.)
 17385. Young. Lofoten, Norway. G. O. Sars. (55.)
 17386. Young. Lofoten, Norway. G. O. Sars. (54.)
 22055. Christiania, Norway. R. Collett.
 17384. Young. Lofoten, Norway. G. O. Sars. (56.)
 17383. Young. Lofoten, Norway. G. O. Sars. (57.)
 17328. Helsingburg, Sweden. Swedish Centennial Commission. (25.)
 10057. Christiania, Norway. R. Collett.

Gadus merlangus, Linn.

17382. Young. Bergen, Norway. Norwegian Government.
 10035. Norway. R. Collett.
 10106. Kiel Bay. Dr. Karl Möbius.
 17329. Helsingburg, Sweden. Swedish Centennial Commission. (26.)
 21134. Calais, France. Mus. d'Hist. Nat. Paris. (34.)

Gadus minutus, Linn.

10038. Norway. R. Collett.
 22054. Christiania, Norway. R. Collett.
 17381. Young. Bergen, Norway. Norwegian Government.

Gadus esmarkii, Nilss.

10034. Norway. R. Collett.
 22056. Christiania, Norway. R. Collett.
 17380. Christiania, Norway. Norwegian Government. (60.)

Gadus meianostomus, Nilss.

10054. Christiania, Norway. R. Collett.

Gadus pollachius, Linn.

17335. Helsingburg, Sweden. Swedish Centennial Commission. (37.)
 17377. Bergen, Norway. Norwegian Government. (62.)
 22057. Christiania, Norway. R. Collett.

Gadus virens, Linn.

17374. Young. Lofoten, Norway. Norwegian Government. (65.)
 17373. Young. Lofoten, Norway. Norwegian Government. (66.)

9565. Young. Lofoten, Norway. G. O. Sars.
 17375. Young. Bergen, Norway. Norwegian Government.
 17502. (Stuffed.) Bergen, Norway. Norwegian Government. (6.)

Phycis mediterraneus, De la Roche.

10209. Spain. Vienna Museum. (32.)

Phycis furcatus, Flem.

17371. Bergen, Norway. Norwegian Government. (68.)

Molva vulgaris, Flem.

10050. Christiania, Norway. R. Collett.
 17370. Bergen, Norway. Norwegian Government. (69.)
 17504. (Stuffed.) Bergen, Norway. Norwegian Government.
 17330. Sweden. Swedish Centennial Commission. (66.)
 17350. Helsingburg, Sweden. (28.)
 16775. England. Liverpool Free Public Museum.

Molva abyssorum, Nilss.

17369. Bergen, Norway. Norwegian Government.

Motella mustela, (Linn.) Nilss.

5747. Near Liverpool, Eng. Wm. Stimpson.

Motella tricirrata, (Bloch) Nilss.

17368. Bergen, Norway. Norwegian Government. (71.)
 5937. Milford Haven. South Wales. Wm. Stimpson.
 5700. ("Motella vulgaris, Cuv.") Europe. Bonaparte Collection.
 10095. ("Motella vulgaris, Cuv.") Europe. Bonaparte Collection.
 10378. Europe. Bonaparte Collection.

Motella maculata, (Risso) Günth.

12618. Europe. Bonaparte Collection. (447.)

Motella cimbria, Linn.

10058. Christiania, Norway. R. Collett.
 22058. Christiania, Norway. R. Collett.

Motella glauca, Jenyns.

22046. Stavanger, Norway. R. Collett.

Brosmius vulgaris, Flem.

17366. Bergen, Norway. Norwegian Government. (73.)

Lota vulgaris, Jenyns.

10096. Europe. Bonaparte Collection. (149.)
 10095. Europe. Bonaparte Collection. (152.)
 10098. Sweden.
 17333. Sweden. Swedish Centennial Commission. (29.)
 2200. Leeds, Eng. Henry Denny.
 21166. France. Mus. d'Hist. Nat. Paris. (66.)

Merluccius vulgaris, (Linn.) Flem.

17372. Bergen, Norway. Norwegian Government. (67.)
 7883. Madeira. Wm. Stimpson.
 10081. ("Merluccius esculentus, Risso.") Europe. Bonaparte Collection. (146.)
 10151. Europe. Bonaparte Collection. (143.)

Family, LYCODIDÆ.

Zoarces viviparus, (Linn.) Cuv.

10065. Kiel Bay. Dr. Karl Möbius.
 17294. Baltic, Sweden. Swedish Centennial Commission. (48.)
 17417. Bergen, Norway. B. Hansen.
 22027. Christiania, Norway. R. Collett.
 3533. Denmark. Sternberg.

Family, AMMODYTIDÆ.

Ammodytes tobianus, Linn.

10166. Europe. Bonaparte Collection. (357.)
 17365. Bergen, Norway. Norwegian Government.
 10044. Norway. R. Collett.

Ammodytes tau, ———.

10041. Norway. R. Collett.

Ammodytes teretissima, ———.

10094. Europe. Bonaparte Collection. (340.)

Family, STICHÆIDÆ.

Stichæus punctatus, (Fabr.) Krøyer.

4588. Greenland. Danish Academy.

Leptoclinus aculeatus, (Reinh.) Gill.

22084. ("Lumpenus lampetraformis, (Wall.).") Lofoten, Norway.
 R. Collett.

By some mistake, a specimen of *Leptoclinus aculeatus* was sent with the number calling for *Lumpenus lampetraformis*.

Family, XIPHIODONTIDÆ.

Centronotus gunellus, Bl. Schn.

10033. Norway. R. Collett.
 22051. Nordland, Norway. R. Collett.
 17418. Bergen, Norway. B. Hansen. (24.)
 2193. Leeds, England. Henry Denny.
 21125. ("Gunellus vulgaris, Flem.") Calais, France. Mus. d'Hist. Nat. Paris. (25.)
 4580. ("Gunellus vulgaris, Flem.") Kattegat. Danish Academy.
 3534. ("Gunellus vulgaris, Flem.") Denmark. Sternberg.

Family, ANARRHICHADIDÆ.

Anarrhichas lupus, Linn.

17419. Bergen, Norway. B. Hansen. (23.)

17506. Stuffed. Bergen, Norway. Norwegian Government. (4.)

Family, BLENNIIDÆ.

Bleennius varus, Pall.

2292. Europe. Bonaparte Collection. (107.)

Bleennius anticolus, Bon.

2293. Europe. Bonaparte Collection. (109.)

Bleennius palmicornis, Cuv. & Val.

2287. Europe. Bonaparte Collection. (132.)

Bleennius ocellaris, Linn.

2288. Europe. Bonaparte Collection. (133.)

Bleennius galerita, Linn.

2291. Europe. Bonaparte Collection. (161.)

Bleennius pholis, Risso.

21149. St. Malo, France. Mus. d'Hist. Nat. Paris. (49.)

Bleennius trigloides, Cuv. & Val.

2289. Europe. Bonaparte Collection. (127.)

Bleennius basiliiscus, Cuv. & Val.

10173. Europe. Bonaparte Collection. (126.)

Carelophus Ascanii, (Walb.) Kr.

22074. Florö, Norway. R. Collett.

Clinus argentatus, Risso.

2294. Europe. Bonaparte Collection. (122.)

Family, URANOSCOPIDÆ.

Uranoscopus scaber, Linn.

2214. Europe. Bonaparte Collection. (475.)

21157. Nice. Mus. d'Hist. Nat. Paris. (57.)

Family, TRACHINIDÆ.

Trachinus draco, Linn.

22012. Europe. Bonaparte Collection. (473.)

21179. France. Mus. d'Hist. Nat. Paris. (79.)

10063. Kiel Bay. Dr. Karl Möbius.

17428. Bergen, Norway. B. Hansen. (13.)

3535. Denmark. Sternberg.

6036. Madeira. Wm. Stimpson.

Family, GOBIESOCIDÆ.

Lepadogaster ciliatus, Risso.

10104. Europe. Bonaparte Collection. (134.)

Lepadogaster biciliatus, Risso.

10172. Europe. Bonaparte Collection. (135.)

Family, LIPARIDIDÆ.

Liparis vulgaris, Flem.

22044. Christiania, Norway. Robert Collett.

22045. Finmarken, Norway. Robert Collett.

Liparis barbatus, Ekstr.

5338. Liverpool. Wm. Stimpson.

5339. Liverpool. Wm. Stimpson.

Liparis Montagui, (Donov.) Cuv.

10239. Bergen, Norway. Bergen Museum. (168.)

22036. Stavanger, Norway. R. Collett.

Family, CYCLOPTERIDÆ.

Cyclopterus lumpus, Linn.

10043. Norway. R. Collett.

10047. Norway. R. Collett.

22049. Nordland, Norway. R. Collett.

17420. Bergen, Norway. B. Hansen. (22.)

17508. Stuffed. Bergen, Norway. Norwegian Government. (3.)

17310. "The Sound," Sweden. Swedish Centennial Commission.
(49.)

Family, CALLIONYMIDÆ.

Callionymus lyra, Linn.

10047. Norway. R. Collett.

22047. Christiania, Norway. R. Collett.

17421. Bergen, Norway. B. Hansen. (21.)

Callionymus maculatus, (Raf.) Bon.

2295. Europe. Bonaparte Collection. (106)

Callionymus festivus, Pallas.

21161. ♀ (7 spec.). Nice, France. Mus. d'Hist. Nat. Paris. (61.)

21162. ♂ (3 spec.). Nice, France. Mus. d'Hist. Nat. Paris. (62.)

Callionymus Morrisonii, Risso.

2297. Europe. Bonaparte Collection. (119.)

Family, GOBIIDÆ.

Gobius niger, Linn.

12572. Europe. Brit. Mus. (449.)
21148. St. Malo, France. Mus. d'Hist. Nat. Paris. (48.)
22043. Christiania, Norway. R. Collett.

Gobius paganellus, Linn.

5385. Europe.

Gobius cruentatus, Gmel.

2282. Europe. Bonaparte Collection.

Gobius minutus, Gmel.

17426. Bergen, Norway. B. Hansen. (16.)
22040. Christiania, Norway. R. Collett.

Gobius quadrimaculatus, Cuv. & Val.

2284. Europe. Bonaparte Collection. (10.)

Gobius ruthensparri, Euphr.

17423. Bergen, Norway. B. Hansen. (19.)
22038. Christiania, Norway. R. Collett.

Gobius microps, Krøyer.

17424. Christiania, Norway. B. Hansen. (18.)
22039. Christiania, Norway. R. Collett.

Gobius pictus, Malm.

17425. Christiania, Norway. B. Hansen. (17.)
22037. Norway. R. Collett.

Latrunculus stuvitzii, (Düb. & Kor.).

17422. Christiania, Norway. B. Hansen. (20.)

Family, TRIGLIDÆ.

Dactylopterus volitans, (Linn.) Lac.

2226. Europe. Bonaparte Collection. (93.)

Trigla aspera, Cuv. & Val.

2219. Europe. Bonaparte Collection. (95.)

Trigla lineata, Gmelin.

2223. Europe. Bonaparte Collection. (102.)
10218. Canaries. Vienna Museum. (42.)

Trigla hirundo, Bloch.

21158. Nice, France. Mus. d'Hist. Nat. Paris. (58.)

Trigla gurnardus, Linn.

17430. Bergen, Norway. B. Hansen. (11.)
 10055. Christiania, Norway. R. Collett.
 22063. Christiania, Norway. R. Collett.
 21176. France. Mus. d'Hist. Nat. Paris. (76.)

Trigla milvus, Lac.

2221. Europe. Bonaparte Collection. (91.)

Trigla lyra, Linn.

2224. Europe. Bonaparte Collection.
 21297. Madeira. Wm. Stimpson.

Trigla obscura, Linn.

2220. Europe. Bonaparte Collection. (96.)

Family, AGONIDÆ.

Agonus cataphractus, Linn.

3288. (3 spec.) Sweden. H. Denny.
 17429. Bergen, Norway. B. Hansen. (12.)
 21101. France. Mus. d'Hist. Nat. Paris. (1.)
 21159. Nice, France. Mus. d'Hist. Nat. Paris. (59.)
 22065. Christiania, Norway. R. Collett.

Peristedion cataphractum, (L. Gm.) Cuv. & Val.

2225. Europe. Bonaparte Collection. (92.)
 2224. Europe. Bonaparte Collection. (91.)

Family, COTTIDÆ.

Cottus gobio, Linn.

2229. Europe. Bonaparte Collection. (104.)
 3286. Nürnberg.
 21106. Paris. Mus. d'Hist. Nat. Paris. (6.)
 21128. Paris. Mus. d'Hist. Nat. Paris. (28.)

Cottus pœcilopus, Heckel.

3287. Sweden.
 22059. Mjosen, Norway. R. Collett.

Cottus scorpius, Linn.

3285. Sweden. H. Denny.
 17433. Bergen, Norway. B. Hansen. (8.)
 22060. Christiania, Norway. R. Collett.

Cottus bubalis, Euphr.

2192. Leeds, Eng. H. Denny.
 3289. Sweden.
 17432. Bergen, Norway. B. Hansen.

Cottus colneus, ———.

8129. ———. Rudolph B. Hitz.

Cottus quadricornis, Linn.

3290. Baltic Sea.

17295. Sweden. Swedish Centennial Commission. (44.)

Phobetor ventralis, Cuv. & Val.

17431. Christiania, Norway. B. Hansen. (10.)

Icelus hamatus, Kröyer.

22085. Hammerfest, Norway. R. Collett.

Centridermichthys uncinatus, (Reinh.) Günth.

22064. Finmarken, Norway. R. Collett.

Family, SCORPÆNIDÆ.

Sebastes norvegicus, (Linn.) Cuv.

10046. Norway. R. Collett.

17435. Bergen, Norway. B. Hansen. (6.)

17436. Bergen, Norway. B. Hansen. (5.)

Sebastes imperialis, Cuv.

17434. Bergen, Norway. B. Hansen.

Sebastes Kuhlii, (Bowd.) Lowe.

8018. Madeira.

10194. Portugal. Vienna Museum. (30.)

Scorpæna porcus, Linn.

10130. Constantinople.

12584. British Museum. (361.)

21110. Marseilles. Mus. d'Hist. Nat. Paris. (10.)

Scorpæna scrofa, Linn.

2231. Europe. Bonaparte Collection. (89.)

10181. Gibraltar. (46.)

Family, LABRIDÆ.

Labrus maculatus, Bloch.

10060. Christiania, Norway. Robert Collett.

17414. Bergen, Norway. B. Hansen. (27.)

17415. Bergen, Norway. B. Hansen. (26.)

Labrus turdus, Linn.

21126. France. Mus. d'Hist. Nat. Paris. (26.)

Labrus mixtus, Linn.

10062. Christiania, Norway. Robert Collett.
 10236. Bergen, Norway. Bergen Museum. (84.)
 17412. Bergen, Norway. Bergen Museum. (29.)
 17413. Bergen, Norway. Bergen Museum. (28.)

Labrus melops, Linn.

10059. Christiania, Norway. Robert Collett.
 22061. Christiania, Norway. Robert Collett.
 12639. (" *Crenilabrus melops*.") Europe. British Museum.
 17411. (" *Crenilabrus melops*.") Bergen, Norway. Bergen Museum.
 (30.)

Ctenolabrus rupestris, (Linn.) Cuv. & Val.

17410. Bergen, Norway. Bergen Museum. (31.)
 22072. Christiania, Norway. Robert Collett.
 22073. Christiania, Norway. Robert Collett.

Ctenolabrus iris, Cuv. & Val.

10164. Europe. Bonaparte Collection. (308.)

Acantholabrus exoletus, Cuv. & Val.

17408. Bergen, Norway. Bergen Museum.
 17409. Bergen, Norway. Bergen Museum. (32.)
 22062. Christiania, Norway. Robert Collett.

Crenilabrus quinquemaculatus, (Bloch) Günth.

10281. Europe. Bonaparte Collection. (321.)

Crenilabrus griseus, (L. Gm.) Günth.

12595. Europe. British Museum.

Crenilabrus ocellatus, (Forsk.) Cuv. & Val.

10152. Europe. Bonaparte Collection. (317.)

Crenilabrus roissali, Risso.

10286. Europe. Bonaparte Collection. (322.)

Crenilabrus sicculus, ———.

10156. Europe. Bonaparte Collection. (410.)

Crenilabrus lapina, Risso.

10285. Europe. Bonaparte Collection. (320.)

Coriscus virescens, Risso.

10087. Europe. Bonaparte Collection. (307.)

Julis pavo, Cuv. & Val.

10210. Canaries. Vienna Museum. (4.)

Julis mediterranea, Risso.

10283. Europe. Bonaparte Collection. (310.)

Julis Geoffroyii, Quoy & Gaim.

10282. Europe. Bonaparte Collection. (385.)

Julis turcica, Risso.

10284. Europe. Bonaparte Collection. (326.)

Family, POMACENTRIDÆ.

Glyphidodon sparoides, Cuv. & Val.

21150. Madagascar. Mus. d'Hist. Nat. Paris. (50.)

Heliastes chromis, (Linn.) Günth.

21160. Nice. Mus. d'Hist. Nat. Paris. (60.)

Family, OSPHROMENIDÆ.

Trichopus trichopterus, (Pallas) Lacep.

21167. Cochin China. Mus. d'Hist. Nat. Paris. (67.)

Trichopus parvipinnis, Sauvage.

21168. (Type.) Laos. Mus. d'Hist. Nat. Paris. (68.)

Family, CHÆTODONTIDÆ.

Chætodon vittatus, (Bl.) Schn.

21170. Sandwich. Mus. d'Hist. Nat. Paris. (70.)

Family, SCOMBRIDÆ.

Scomber scombrus, Linn.

5379. Europe.

5380. Europe.

10037. Norway. Robert Collett.

16773. England. Liverpool Free Public Museum.

16774. England. Liverpool Free Public Museum.

17312. Sweden. Swedish Centennial Commission. (46.)

17427. Bergen, Norway. B. Hansen.

Scomber pneumatophorus, De la Roche.

10182. Canaries. Vienna Museum. (29.)

Pelamys sarda, (Bl.) Cuv. & Val.

5378. Europe.

Family, CARANGIDÆ.

Trachurus trachurus, (Linn.) Günth.

3524. Malaga, Mediterranean.

3563. Europe.

2270. (" *Caranx trachurus*.") Europe. Bonaparte Collection. (377.)

22067. (" *Caranx trachurus*.") Christiania, Norway. R. Collett.

Decapterus Jacobæus, (Cuv. & Val.).

21260. Madeira. Wm. Stimpson.

Caranx dentex, Cuv. & Val.

10207. Canaries. Vienna Museum. (47.)

Argyreiosus setipinnis, (Mitch.) Günth.

12583. Atlantic. British Museum. (98.)

Naucrates ductor, (Bl.) Cuv. & Val.

2276. Enrope. Bonaparte Collection. (366.)

Psettus sebæ, Cuv. & Val.

4105. Cape Palmas, Africa. R. H. Steele.

Family, STROMATEIDÆ.

Stromateus microchirus (Bonelli) Bon.

2273. Europe. Bonaparte Collection. (382.)

Family, ZENIDÆ.

Zeus faber, Linn.

2271. Europe. Bonaparte Collection. (494.)

21191. France. Mus. d'Hist. Nat. Paris. (91.)

Family, CAPRIDÆ.

Caprcs aper, (Linn.) Lacép.

2279. Europe. Bonaparte Collection. (33.)

Family, MULLIDÆ.

Mullus surmuletus, Linn.

2217. Europe. Bonaparte Collection. (101.)

Family, BERYCIDÆ.

Beryx splendens, Lowe.

10213. Canaries. Vienna Museum. (10.)

Family, SPARIDÆ.

Cantharus lineatus, (Montagu) White.

10214. Canaries. Vienna Museum. (116.)

21183. France. Mus. d'Hist. Nat. Paris. (83.)

Cantharus ranuda, Risso.

10377. Europe. Bonaparte Collection. (56.)

Box vulgaris, Cuv. & Val.

10180. Canaries. Vienna Museum. (43.)

21120. Morea, Turkey. Mus. d'Hist. Nat. Paris. (20.)

Box salpa, (Linn.) Cuv. & Val.

2254. Europe. Bonaparte Collection. (20.)
10203. Spain. Vienna Museum. (37.)
21111. Algeria. Mus. d'Hist. Nat. Paris. (11.)

Oblata melanura, (Linn.) Cuv. & Val.

2255. Europe. Bonaparte Collection. (19.)
21104. Naples. Mus. d'Hist. Nat. Paris. (4.)

Sargus vulgaris, Geoffr.

12581. Europe. British Museum. (362.)

Sargus Salviani, Cuv. & Val.

21109. Algeria. Mus. d'Hist. Nat. Paris. (9.)

Sargus Rondeletii, Cuv. & Val.

2241. Europe. Bonaparte Collection. (46.)

Sargus annularis, (L. Gm.) Geoffr.

2240. Europe. Bonaparte Collection. (44.)
10219. Canaries. Vienna Museum. (19.)

Sargus fasciatus, Cuv. & Val.

21107. Algeria. Mus. d'Hist. Nat. Paris. (7.)
21108. Algeria. Mus. d'Hist. Nat. Paris. (8.)

Sargus Juliani, ———.

2242. Europe. Bonaparte Collection. (45.)

Pagellus erythrinus, (Linn.) Cuv. & Val.

2245. Europe. Bonaparte Collection. (48.)
10200. Spain. Vienna Museum. (51.)

Pagellus centrodontus, (De la Roche) C. & V.

2247. Europe. Bonaparte Collection. (50.)
10216. Spain. Vienna Museum. (36.)
17437. ("Sparus centrodontus.") Bergen, Norway. B. Hansen. (4.)

Pagellus acarne, (Cuv.) Cuv. & Val.

10185. Spain. Vienna Museum. (39.)
21102. Algeria. Mus. d'Hist. Nat. Paris. (2.)

Pagellus mormyrus, (Linn.) Cuv. & Val.

21103. Algeria. Mus. d'Hist. Nat. Paris. (3.)

Sparus auratus, Linn.

2244. Europe. Bonaparte Collection. (43.)

Family, MÆNIDIDÆ.

Mæna vomerina, Cuv. & Val.

2260. Europe. Bonaparte Collection. (23.)

Mæna Osbeckii, (Lacép.) Cuv. & Val.

2259. Europe. Bonaparte Collection. (22.)

Family, PRISTIPOMATIDÆ.

Pristipoma Bennettii, Lowe.

10211. Canaries. Vienna Museum. (22.)

Dentex vulgaris, Cuv. & Val.

5900. Europe. Bonaparte Collection.

Datnioides polota, Bleek.

21173. Siam. Mus. d'Hist. Nat. Paris. (73.)

Smaris vulgaris, Cuv. & Val.

2261. Europe. Bonaparte Collection. (26.)

5384. Mediterranean.

Smaris alcedo, (Risso) Cuv. & Val.

2263. Europe. Bonaparte Collection. (29.)

Smaris Maurii, Bon.

6053. Europe.

Smaris gracilis, Bon.

2267. Europe. Bonaparte Collection. (25.)

Smaris insidiator, Cuv. & Val.

2262. Europe. Bonaparte Collection. (31.)

Family, SERRANIDÆ.

Serranus scriba, (Linn.) Cuv. & Val.

10222. Spain. Vienna Museum. (3.)

Serranus cabrilla, (Linn.) Cuv. & Val.

2204. Europe. Bonaparte Collection. (70.)

Serranus hepatus, Cuv. & Val.

21105. Algeria. Mus. d'Hist. Nat. Paris. (5.)

Polyprion cernium, Val.

5749. Europe. Bonaparte Collection.

Anthias sacer, Bloch.

2206. Europe. Bonaparte Collection. (77.)

Family, PERCIDÆ.

Perca fluviatilis, Linn.

2191. Leeds, Eng. Henry Denny.

10229. Danube. Vienna Museum. (19.)

12691. Sweden.

17322. Sweden. Swedish Centennial Commission. (43.)

21143. Paris. Mus. d'Hist. Nat. Paris. (43.)

Perca Schrenki, Kessl.

21592. Sassyk ala Kul, Siberia. Dr. O. Finsch. (103.)

21593. Sassyk ala Kul, Siberia. Dr. O. Finsch. (133.)

21594. Sassyk ala Kul, Siberia. Dr. O. Finsch. (342.)

Acerina Schrætzeri, (Linn.) Cuv. & Val.

2209. Europe. Bonaparte Collection. (60.)

10188. Danube. Vienna Museum. (13.)

10247. ("Aspro schratzer.") Europe. R. Hessel.

Acerina cernua, (Linn.) Günth.

12694. Switzerland.

21131. Paris. Mus. d'Hist. Nat. Paris. (31.)

Acerina vulgaris, Cuv. & Val.

10197. Danube. Vienna Museum. (9.)

Lucioperca sandra, Cuv.

10243. Danube. Rudolph Hessel.

17326. Sweden. Swedish Government. (47.)

Lucioperca volgensis, Cuv. & Val.

10184. Danube. Vienna Museum. (12.)

Aspro Zingel, (Linn.) Cuv. & Val.

10720. Europe. R. Hessel.

Aspro vulgaris, Cuv.

10248. Europe. R. Hessel.

Family, LABRACIDÆ.

Labrax lupus, (Lacép.) Cuv.

5712. Europe. Bonaparte Collection.

17501. (Stuffed.) Bergen, Norway. Bergen Museum. (2.)

21171. France. Mus. d'Hist. Nat. Paris. (71.)

Lates colonorum, Günth.

12680. ———. British Museum. (14.)

Family, CHILODIPTERIDÆ.

Apogon rex-mullorum, Cuv. & Val.

2216. Europe. Bonaparte Collection. (19.)

21916. Europe. Bonaparte Collection.

10225. Canaries. Vienna Museum. (5.)

Family, SPHYRÆNIDÆ.

Sphyræna vulgaris, Cuv. & Val.

10190. Canaries. Vienna Museum. (19.)

12591. ———. British Museum. (379.)

Sphyræna spet, Lacép.

21251. Europe. Bonaparte Collection.

Family, ECHENEIDIDÆ.

Echeneis remora, Linn.

5822. ———. (477 B.)

21127. France. Mus. d'Hist. Nat. Paris. (27.)

Family, CEPOLIDÆ.

Cepola rubescens, Linn.

10138. Europe. Bonaparte Collection. (479.)

21156. Nice. Mus. d'Hist. Nat. Paris. (56.)

Family, ATHERINIDÆ.

Atherina presbyter, Cuv.

21130. France. Mus. d'Hist. Nat. Paris. (30.)

Atherina hepsetus, Linn.

10157. Europe. Bonaparte Collection. (470.)

Atherina Boyeri, Risso.

10160. Europe. Bonaparte Collection. (469.)

Atherina Rissoi, Cuv. & Val.

2943. Europe. Bonaparte Collection. (343.)

Family, MUGILIDÆ.

Mugil cephalus, Cuv.

2299. Europe. Bonaparte Collection. (86.)

Mugil capito, Cuv.

5383. Europe.

21172. Mediterranean. Mus. d'Hist. Nat. Paris. (72.)

Mugil saliens, Risso.

2936. Europe. Bonaparte Collection. (82.)

Mugil labeo, Cuv.

2938. Europe. Bonaparte Collection. (141.)

Mugil septentrionalis, Günth.

17416. Bergen, Norway. B. Hansen.

Mugil chelo, Cuv.

2937. Europe. Bonaparte Collection. (84.)

10186. Canaries. Vienna Museum. (1.)

Family, CENTRISCIDÆ.

Centruscus scolopax, Linn.

7547. Europe. Bonaparte Collection.

Family, GASTEROSTEIDÆ.

Gasterosteus aculeatus, Linn.

17439. Bergen, Norway. Bergen Museum. (2.)

22042. Romsdal, Norway. Robert Collett.

Gasterosteus gymnuris, Cuv.

22041. ("*G. aculeatus* var. *gymnuris*.") Tromsö, Norway. Robert Collett.

17303. (Part.) Sweden. Swedish Centennial Commission. (45.)

21138. ("*G. leiurus*.") Paris. Mus. d'Hist. Nat. Paris. (38.)

Gasterosteus semiarmatus, Cuv. & Val.

17303. (Part.) Sweden. Swedish Centennial Commission. (45.)

Gasterosteus trachurus, Cuv. & Val.

21137. Caen, France. Mus. d'Hist. Nat. Paris. (37.)

Gasterosteus pungitius, Linn.

22015. Christiania, Norway. Robert Collett.

Gasterosteus spinachia, Linn.

17438. ("*Spinachia vulgaris*, Flem.") Bergen, Norway. B. Hansen. (3.)

21129. ("*Gastron spinachia*.") La Rochelle. Mus. d'Hist. Nat. Paris. (29.)

22021. ("*Spinachia vulgaris*, Flem.") Christiania, Norway. Robert Collett.

Gasterosteus argentatissimus, Blanchard.

21140. (Type.) Avignon, France. Mus. d'Hist. Nat. Paris. (40.)

Gasterosteus blanchardi, Sauvage.

21139. (Type.) Boston, U. S. Mus. d'Hist. Nat. Paris. (39.)

This species is identical with the common many-spined Stickleback of the East Coast of North America (*Pygosteus occidentalis*, [C. & V.] Brevoort), and the latter is identical with the *Gasterosteus pungitius* of Linné.—BEAN.

Family, BELONIDÆ.

Belone vulgaris, Flem.

10045. Norway. Robert Collett.

17464. Bergen, Norway. Bergen Museum. (106.)

22086. Stavanger, Norway. Robert Collett.

Belone longirostris, ———.

10107. Kiel Bay. Dr. Möbius.

Family, ESOCIDÆ.

Esox lucius, Linn.

2199. Leeds, Eng. Henry Denny.
 10205. Danube. Vienna Museum. (31.)
 17345. Sweden. Swedish Centennial Commission. (60.)
 17463. Bergen, Norway. Bergen Museum. (105.)
 21153. Paris. Mus. d'Hist. Nat. Paris. (53.)
 21606. Obi River, Siberia. Dr. Otto Finsch. (18.)

Family, CYPRINODONTIDÆ.

Cyprinodon calaritanus, Cuv. & Val.

5002. Enrope. Bonaparte Collection.

Lebias ibericus, Steind.

10226. Valencia, Spain. Vienna Museum. (20.)

Family, STERNOPTYCHIDÆ.

Sternoptyx mediterranea, Cocco.

10143. Europe. Bonaparte Collection. (455.)

Maurolicus borealis, Nilss.

22048. Finnmarken, Norway. Robert Collett.

Family, SCOPELIDÆ.

Chlorophthalmus Agassizii, Bou.

10161. Europe. Bonaparte Collection. (81.)

Scopelus Benoitii, Cocco.

10163. Europe. Bonaparte Collection. (461.)

Scopelus Humboldtii, Risso.

10170. Europe. Bonaparte Collection. (463.)

Scopelus dellachiaji, ———.

10168. Europe. Bonaparte Collection. (458.)

Family, SYNODONTIDÆ.

Saurus griseus, Lowe.

12627. ———. British Museum. (89.)

Family, MICROSTOMIDÆ.

Mallotus villosus, (Müll.) Cuv. & Val.

17457. Finnmarken, Norway. Bergen Museum. (99.)
 10237. ("Osmorus arcticus," Nilss.) Finnmarken, Norway. Bergen Museum.

Osmerus eperlanus, (Linn.) Lacép.

- 16715. England. Liverpool Free Public Museum.
- 20932. Sweden. (90 and 91.)
- 21136. France. Mus. d'Hist. Nat. Paris. (36.)
- 22077. Mjosen, Norway. Robert Collett.

Argentina silus, (Ascan.) Nilss.

- 17462. Bergen, Norway. Bergen Museum.

Argentina sphyraena, Linn.

- 10082. Europe. Bonaparte Collection. (332.)
- 17461. Christiania, Norway. Bergen Museum.
- 22076. Christiania, Norway. Robert Collett.
- 10083. Europe. Bonaparte Collection. (331.)

Argentina hebridica, Yar. & Nilss.

- 10052. Christiania, Norway. Robert Collett.

Family, COREGONIDÆ.

Thymallus vulgaris, Nilss.

- 2198. Leeds, Eng. Henry Denny.
- 10244. Europe. Rudolph Hessel.
- 17341. Sweden. Swedish Centennial Commission. (62.)
- 17460. Christiania, Norway. Bergen Museum.

Coregonus oxyrhynchus, (Linn.) Kröyer.

- 17291. Lake Vettern, Sweden. Swedish Centennial Commission. (10.)
- 17301. Lake Venern, Sweden. Swedish Centennial Commission. (12.)
- 17458. Christiania, Norway. Bergen Museum.
- 21192. Holland. Mus. d'Hist. Nat. Paris. (92.)

Coregonus lavaretus, Linn.

- 17300. Lake Venern, Sweden. Swedish Centennial Commission. (14.)
- 17353. Augermanelfren River, Sweden. Swedish Centennial Commission. (15.)
- 22078. Jæderen, Norway. Robert Collett.

Coregonus fera, Cuv. & Val.

- 10245. Europe. Rudolph Hessel.

Coregonus fera, Widegren.

- 17314. Sweden. Swedish Centennial Commission. (11.)
- 17327. Sweden. Swedish Centennial Commission. (13.)

Coregonus maræna, Nilss.

10240. Pomerania. Rudolph Hessel.

12676. Pomerania. Rudolph Hessel.

Coregonus Nilssoni, Cuv. & Val.17344. Lake Ringsjön, Sweden. Swedish Centennial Commission.
(16.)**Coregonus albula**, Linn.

10572. Lake Malaren, Sweden.

17297. Sweden. Swedish Centennial Commission. (64.)

17459. Christiania, Norway. Bergen Museum. (101.)

Coregonus Merkiti, Günth.

21604. Obi River, Siberia. Dr. Otto Finsch. (59.)

Coregonus syrok, Cuv.

21602. Obi River, Siberia. Dr. Otto Finsch. (36.)

21603. Obi River, Siberia. Dr. Otto Finsch. (37.)

Family, SALMONIDÆ.

Salmo salar, Linn.

3576. Sweden.

10242. Rhine River. Rudolph Hessel.

10675. Rhine River. Rudolph Hessel.

17342. Nisswan River. Swedish Government. (4.)

17440. Bergen, Norway. B. Hansen. (88.)

Salmo trutta, Nilss.

10108. Kiel Bay. Dr. Möbius.

17296. (Sterile.) Angermanelfren River, Sweden. Swedish Centennial Commission. (6.)

17347. Angermanelfren River, Sweden. Swedish Centennial Commission. (3.)

17349. Angermanelfren River, Sweden. Swedish Centennial Commission. (2.)

17343. ♂ and ♀. Sweden. Swedish Government. (5.)

17441. One year old. Bergen, Norway. B. Hansen. (89.)

17442. Ten months old. Bergen, Norway. B. Hansen.

17346. (Var. "lacustris.") Lake Vettern, Sweden. Swedish Centennial Commission.

Salmo eriox, Krøyer.

22079. Christiania, Norway. Robert Collett.

10053. Norway. Robert Collett.

22080. (Formerly "fario.") Dramen, Norway. Robert Collett.

22081. (Formerly "fario.") Dramen, Norway. Robert Collett.

22082. (Formerly "fario.") Dramen, Norway. Robert Collett.

Salmo fario, Linn.

1735. Neufchatel. Prof. L. Agassiz.
 16721. Adult. England. Liverpool Free Public Museum.
 16722. Young. England. Liverpool Free Public Museum.
 16723. Young. England. Liverpool Free Public Museum.
 21165. ("Trutta fario.") France. Mus. d'Hist. Nat. Paris. (65.)
 10228. ("Trutta fario.") Spain. Vienna Museum. (35.)

Salmo punctatus, Nilss.

17443. Bergen, Norway. B. Hansen. (91.)

Salmo lacustris, Linn.

10557. Lake Constance, Switzerland. Rudolph Hessel.

Salmo salvelinus, Linn.

10249. Europe. Rudolph Hessel.
 17351. Sweden. Swedish Centennial Commission. (8.)

Salmo alpinus, Linn.

3571. Sweden. Swedish Academy. (107.)
 3572. Sweden. Swedish Academy.
 17299. Sweden. Swedish Academy. (9.)
 17456. Bergen, Norway. Bergen Museum.

Salmo hucho, Linn.

10725. Danube River. Rudolph Hessel.

Salmo ocla, Nilss.

3573. ♂. Sweden. Swedish Academy.

Salmo pallidus, Nilss.

7575. Lake Vettern, Sweden. Swedish Academy. (109.)

Bastards.

17453. (One year.) *Salmo fario*, pater. *Salmo alpinus*, mater. Stavanger, Norway. C. B. Hansen. (97a.)
 17454. (One year.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen. (97b.)
 17452. (Two years.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen. (96.)
 17450. (Three years.) *Salmo fario*, pater. *Salmo alpinus*, mater. Stavanger, Norway. C. B. Hansen. (95a.)
 17451. (Three years.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen. (95b.)
 17448. (Four years.) *Salmo fario*, pater. *Salmo alpinus*, mater. Stavanger, Norway. C. B. Hansen. (94a.)
 17449. (Four years.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen. (94b.)

17447. (Five years.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen. (93b.)
 17446. (Five years.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen.
 17444. (Six years.) *Salmo fario*, pater. *Salmo alpinus*, mater. Stavanger, Norway. C. B. Hansen. (92a.)
 17445. (Six years.) *Salmo fario*, mater. *Salmo alpinus*, pater. Stavanger, Norway. C. B. Hansen. (92b.)

Family, CLUPEIDÆ.

Alosa finta, Yarrell.

10146. Europe. Bonaparte Collection. (350.)

Clupea pilchardus, Walb.

10192. ("Alosa pilchardus, C. & V.") Gibraltar. Vienna Museum. (45.)

Clupea harengus, Linn.

10039. Norway. Robert Collett.
 10040. Norway. Robert Collett.
 10049. Norway. Robert Collett.
 10280. Christiania, Norway. Axel Boeck.
 17336. Sweden. Swedish Centennial Commission. (17.)
 17339. Kivik, Sweden. Swedish Centennial Commission. (19.)
 17340. Malmö, Sweden. Swedish Centennial Commission. (18.)
 17469. Bödö, Norway. Bergen Museum.
 17470. Bergen, Norway. Bergen Museum.
 17471. Bergen, Norway. Bergen Museum.
 17472. Bergen, Norway. Bergen Museum.
 17473. Bergen, Norway. Bergen Museum.
 17474. Bergen, Norway. Bergen Museum.
 17475. Bergen, Norway. Bergen Museum.
 17476. Bergen, Norway. Bergen Museum. (118.)
 17477. Bergen, Norway. Bergen Museum. (119.)
 17478. Bergen, Norway. Bergen Museum. (120.)
 17485. ("Prius May.") Christiania, Norway. Bergen Museum. (127.)
 22068. Christiania, Norway. Robert Collett.
 22069. Nordland, Norway. Robert Collett.
 22070. Nordland, Norway. Robert Collett.
 17484. (About 1 month old.) Norway. Bergen Museum. (126.)
 17483. (About 2½ months old.) Norway. Bergen Museum. (125.)
 17482. (About 3 months old.) Norway. Bergen Museum. (124.)
 17481. (About 4 months old.) Norway. Bergen Museum. (123.)
 17480. (About 5 months old.) Norway. Bergen Museum. (122.)
 17479. (About 7 months old.) Norway. Bergen Museum. (121.)

17311. ("Var. *membras*.") Off Stockholm, Sweden. Swedish Centennial Commission. (20.)
 17315. ("Var. *membras*.") Gulf of Bothnia, Sweden. Swedish Centennial Commission. (21.)

***Clupea sprattus*, Linn.**

10048. Norway. Robert Collett.
 10064. Kiel Bay. Dr. Karl Möbins.
 17298. West coast of Sweden. Swedish Centennial Commission. (22.)
 17486. Bergen, Norway. Bergen Museum. (128.)
 22071. Christiania, Norway. Robert Collett.

***Clupea sardina*, Cuv.**

10041. Europe. Bonaparte Collection. (450.)

Family, ENGRAULIDIDÆ.

***Engraulis encrasicolus*, (Linn.) Cuv.**

10153. Europe. Bonaparte Collection. (454.)
 22075. Christiania, Norway. Robert Collett.

Family, CYPRINIDÆ.

***Cyprinus carpio*, Linn.**

2194. Leeds, Eng. Henry Denny.
 14861. Europe.
 21152. Paris. Mus. d'Hist. Nat. Paris. (52.)
 21188. "Carpe à mirori." Troyes, France. Mus. d'Hist. Nat. Paris. (88.)
 21190. "Carpe à mirori." Troyes, France. Mus. d'Hist. Nat. Paris. (90.)
 10565. "*Cyprinus cyprinorum*." Europe. Rudolph Hessel.

***Cyprinus regina*, Bon.**

10144. Europe. Bonaparte Collection. (425.)

***Carassius vulgaris*, (Linn.) Nilss.**

10150. Europe. Bonaparte Collection. (430.)
 10196. Danube. Vienna Museum. (28.)

***Carassius gibelio*, (Bloch) Nilss.**

3487. Sweden.
 17465. Norway. Bergen Museum. (107.)
 21189. ("*Cyprinopsis gibelio*.") Troyes, France. Mus. d'Hist. Nat. Paris. (89.)

***Carassius linnai*, Bon.**

3486. Sweden.

Barbus plebejus, Val.

10079. Europe. Bonaparte Collection. (284.)
 10149. Europe. Bonaparte Collection. (726.)

Barbus eques, (Heckel) Kner.

10103. Europe. Bonaparte Collection. (283.)

Barbus fluviatilis, Ag.

3523. Nürnberg.
 10189. Danube. Vienna Museum. (2.)
 20542. France. Goldsmith.
 21154. Paris. Mus. d'Hist. Nat. Paris. (54.)

Barbus Bocagii, Steind.

10187. Spain. Vienna Museum. (15.)

Barbus comiza, Steind.

10198. Madrid. Vienna Museum. (6.)

Schizothorax orientalis, Kessl.

21597. Sassyk ali Kul, Siberia. Dr. Otto Finsch. (246.)

Diptychus Dybowski, Kessl.

21598. ♀. Dschelonasch River, Siberia. Dr. Otto Finsch. (195.)
 21599. ♂. Dschelonasch River, Siberia. Dr. Otto Finsch. (158.)
 21600. *Juv.* Bulenka River, near Sepra, Siberia. Dr. Otto Finsch.
 (280.)

Gobio fluviatilis, Flem.

3490. Nürnberg.
 3489. Leeds, Eng. Henry Denny.
 1737. Neufchatel. Agassiz.
 10127. Europe. Bonaparte Collection. (115.)
 10224. Danube. Vienna Museum. (38.)
 21135. Paris. Mus. d'Hist. Nat. Paris. (35.)
 21607. Alpine lake, 5,000 feet high, Siberia. Dr. Otto Finsch.
 10167. ("*Gobio lutescens*," De Filippi.) Europe. Bonaparte Col-
 lection. (280.)

Gobio uranoscopus, (Ag.) Cuv. & Val.

10142. Europe. Bonaparte Collection. (277.)

Leuciscus rutilus, (Linn.) Flem.

2195. Leeds, Eng. Henry Denny.
 17317. Sweden. Swedish Centennial Commission. (54.)
 17466. Norway. Bergen Museum. (108.)
 21146. Paris. Mus. d'Hist. Nat. Paris. (46.)
 21605. Obi River, Siberia. Dr. Otto Finsch. (63.)
 3596. ("*Gardonus rutilus*,") Europe.

Leuciscus grislagine, (Linn.) Nilss.

17309. Sweden. Swedish Centennial Commission. (51.)
 21596. ("*Squalius grislagine*.") Siberia. Dr. Otto Finsch.
 3497. ["*Gardonus (Cephalus) grislagine*."] Sweden.

Leuciscus rodens, (Heckel) Ag.

1728. Neufchatel. Agassiz.

Leuciscus idus, Linn.

17319. Sweden. Swedish Centennial Commission. (52.)
 10250. ("*Idus melanotus*.") Danube. Rudolph Hessel.
 21595. ("*Idus melanotus*.") Obi River, Siberia. Dr. Otto Finsch.
 (41.)

Leuciscus erythrophthalmus, (Linn.) Flem.

1726. Europe. Agassiz.
 17325. Sweden. Swedish Centennial Commission. (53.)
 3499. ("*Scardinius erythrophthalmus*.") Sweden.
 21185. Troyes, France. Mus. d'Hist. Nat. Paris. (85.)

Leuciscus phoxinus, (Linn.) Flem.

17304. Sweden. Swedish Academy. (55.)
 3494. ("*Phoxinus laevis*.") Nürnberg.
 3495. ("*Phoxinus laevis*.") Leeds, Eng.
 10140. ("*Phoxinus laevis*.") Europe. Bonaparte Collection. (303.)
 21180. ("*Phoxinus laevis*.") Perm, Russia. Mus. d'Hist. Nat.
 Paris. (80.)

Phoxinus aphyia, (Linn.) Kröyer.

17455. Christiania, Norway. Bergen Museum. (114.)
 22050. Girdbrandsdal, Norway. Robert Collett.

Phoxinellus croaticus, Steind.

10193. Croatia. Vienna Museum. (56.)

Leuciscus cephalus, (Linn.) Flem.

17467. Southeastern Norway. Bergen Museum. (109.)
 3498. ("*Squalius dobula*.") Nürnberg.
 21145. ("*Squalius cephalus*.") Paris. Mus. d'Hist. Nat. Paris. (45.)
 10139. ("*Leuciscus paretii*," Bon.) Europe. Bonaparte Collection.
 (307.)

Squalius leuciscus, Heckel.

21187. Troyes, France. Mus. d'Hist. Nat. Paris. (87.)

Telestes Savignyi, (Bon.).

2887. Europe. Bonaparte Collection. (300.)

Tinca vulgaris, Cuv.

- 3492. Sweden.
- 10246. Europe. Rudolph Hessel.
- 17292. Sweden. Swedish Centennial Commission. (50.)
- 21151. Paris. Mus. d'Hist. Nat. Paris. (51.)

Tinca chrysitis, Ag.

- 10159. Europe. Bonaparte Collection. (275.)

Chondrostoma nasus, (Linn.) Ag.

- 3522. Nürnberg.
- 21144. Paris. Mus. d'Hist. Nat. Paris. (44.)

Chondrostoma polylepis, Steind.

- 10183. Spain. Vienna Museum. (33.)

Rhodeus amarus, (Bloch) Ag.

- 3488. Nürnberg.
- 21132. Paris. Mus. d'Hist. Nat. Paris. (32.)

Abramis brama, (Linn.) Flem.

- 3516. Nürnberg.
- 17306. Sweden. Swedish Centennial Commission. (57.)
- 17468. Southeastern Norway. Bergen Museum.
- 20553. France. Goldsmith.
- 21147. Paris. Mus. d'Hist. Nat. Paris. (47.)
- 21186. Troyes, France. Mus. d'Hist. Nat. Paris. (86.)

Abramis vimba, (Linn.) Cuv. & Val.

- 10206. Danube. Vienna Museum. (16.)
- 10408. Vienna Museum.
- 17289. Sweden. Swedish Centennial Commission. (56.)

Abramis blicca, (Bloch) Cuv.

- 1734. Neufchatel. Agassiz.

Abramis björkna, (L.) Nilss.

- 3518. ("Blicca björkna.") Sweden.
- 10199. ("Blicca argyroleuca.") Danube. Vienna Museum. (41.)
- 17338. ("Blicca björkna.") Sweden. Swedish Centennial Commission. (58.)

Abramis ballerus, (L.) Cuv. & Val.

- 3519. Sweden.

Aspius alburnus, Agassiz.

- 17302. Sweden. Swedish Centennial Commission. (59.)

Alburnus lucidus, Heck. & Kner.

3521. Nürnberg.
21155. Paris. Mus. d'Hist. Nat. Paris. (55.)
21184. Troyes, France. Mus. d'Hist. Nat. Paris. (84.)

Alburnus alborella, (De Fillipi).

10155. Europe. Bonaparte Collection. (289.)

Pelecus cultratus, (Linn.) Ag.

10215. Danube. Vienna Museum. (7.)
10149. Europe. Bonaparte Collection. (726.)

Family, COBITIDÆ.

Diplophysa labiata, Kessl.

21601. Bulenka River, Siberia. Dr. Otto Finsch. (320.)
21608. Bulenka River, Siberia. Dr. Otto Finsch. (136.)

Misgurnus fossilis, (Linn.) Lacép.

3482. Nürnberg. Thomas Rainey.
10089. Europe. Bonaparte Collection. (157.)
21142. Germany. Mus. d'Hist. Nat. Paris. (42.)

Cobitis barbatula, Linn.

3483. Nürnberg. Thomas Rainey.
10201. Danube. Vienna Museum. (49.)
21141. Paris. Mus. d'Hist. Nat. Paris. (41.)

Cobitis tænia, Linn.

3484. Nürnberg. Thomas Rainey.
3485. Nürnberg. Thomas Rainey.
10162. ("*Acanthopsis tænia*.") Europe. Bonaparte Collection.
(158.)

Order, NEMATOGNATHI.

Family, SILURIDÆ.

Silurus glanis, Linn.

10191. Danube. Vienna Museum. (53.)
17293. Sweden. Swedish Centennial Commission. (61.)

Order, APODES.

Family, CONGRIDÆ.

Conger vulgaris, Cuv.

17488. Bergen, Norway. Bergen Museum. (130.)
17507. (Stuffed.) Bergen, Norway. Bergen Museum. (8.)

Family, ANGUILLIDÆ.

Anguilla vulgaris, Turton.

- 17321. Sweden. Swedish Academy. (39.)
- 17331. Sweden. Swedish Academy. (67.)
- 17487. Bergen, Norway. Bergen Museum. (129.)
- 21181. Paris. Mus. d'Hist. Nat. Paris. (81.)
- 22025. Stavanger, Norway. Robert Collett.
- 10042. ("*Murana anguilla*," Linn.) Norway. Robert Collett.

Order, GLANIOSTOMI.

Family, ACIPENSERIDÆ.

Acipenser sturio, Linn.

- 2174. (22003.) Europe. Bonaparte Collection.
- 17505. (Stuffed.) Bergen, Norway. Bergen Museum. (9.)

Acipenser ruthenus, Linn.

- 10195. Danube. Vienna Museum. (17.)

Acipenser naccarii, Bon.

- 2175. (22004.) Europe. Bonaparte Collection.

Class, ELASMOBRANCHII.

Order, HOLOCEPHALI.

Family, CHIMÆRIDÆ.

Chimæra monstrosa, Linn.

- 10233. ♂. Bergen, Norway. Bergen Museum. (37.)
- 10234. ♀. Bergen, Norway. Bergen Museum. (74.)
- 17492. ♂. Bergen, Norway. Bergen Museum.
- 17493. ♀. Bergen, Norway. Bergen Museum. (135.)

Order, RAJÆ.

Family, TORPEDINIDÆ.

Torpedo Galvanii, Risso.

- 10221. Spain. Vienna Museum.

Family, RAJIDÆ.

Raja radiata, Donov.

- 17318. Sweden. Swedish Centennial Commission. (40.)
- 17497. Bergen, Norway. Bergen Museum. (139.)

Order, SQUALI.

Family, LAMNIDÆ.

Lamna cornubica, (Gm.) Flem.

17509. (Stuffed.) Bergen, Norway. Bergen Museum. (10.)

Family, SCYLLIIDÆ.

Scyllium catulus, (Linn.).

10220. Cadiz, Spain. Vienna Museum. (52.)

Pristiurus melanostomus, (Raf.) Bon.

17494. ♂. Bergen, Norway. Bergen Museum. (136.)

Family, SPINACIDÆ.

Acanthias vulgaris, Risso.

17495. ♀ *juv.* Bergen, Norway. Bergen Museum. (137.)

21178. France. Mus. d'Hist. Nat. Paris. (78.)

Spinax niger, Bon.

10051. Christiania, Norway. Robert Collett.

10235. Bergen, Norway. Bergen Museum. (28.)

17496. Bergen, Norway. Bergen Museum. (138.)

Class, MARSIPOBRANCHII.

Order, HYPEROARTIA.

Family, PETROMYZONTIDÆ.

Petromyzon marinus, Linn.

17498. Bergen, Norway. Bergen Museum. (140.)

Petromyzon fluviatilis, Linn.

21133. France. Mus. d'Hist. Nat. Paris. (33.)

22010. Sweden. (86.)

Petromyzon Planeri, Bloch.

22005. Sweden. (88.)

22006. Sweden. (89.)

22011. Nürnberg.

22026. ("Petromyzon branchialis.") Ostendalen, Norway. Robert Collett.

Petromyzon sp.

17334. Sweden. Swedish Centennial Commission. (41.)

Ammocetes sp.

17307. (*Juv.*) Sweden. Swedish Centennial Commission. (42.)

Order, HYPEROTRETI.

Family, MYXINIDÆ.

Myxine glutinosa, Linn.

4584. Kattegat. Danish Academy.

17499. Bergen, Norway. Bergen Museum. (141.)

Class, LEPTOCARDII.

Order, CIRROSTOMI.

Family, BRANCHIOSTOMIDÆ.

Branchiostoma lanceolatum, (Pallas) Gray.

22083. Stavanger, Norway. Robert Collett.

DESCRIPTION OF A SPECIES OF LYCODES (*L. PAXILLUS*) OBTAINED BY THE UNITED STATES FISH COMMISSION.**By G. BROWN GOODE and TARLETON H. BEAN.**

A single specimen of an apparently undescribed species of *Lycodes* was obtained by Capt. Joseph W. Collins and the crew of the schooner Marion of Gloucester, from the gully between Le Have and Sable Island Banks, in latitude $42^{\circ} 48' N.$, longitude $63^{\circ} 07' W.$, and presented to the United States Fish Commission for the National Museum. The specimen, which is $14\frac{3}{8}$ inches in length, is in a dilapidated condition, and was apparently taken from the stomach of a fish, probably a halibut. Fishing in this locality is carried on exclusively with trawls or long-lines at a depth of 1,200 to 2,400 feet.

The form of *Lycodes paxillus* is rounder and more terete than that of any other described species. It is also easily distinguished by its very short head, by the peculiar curvature of the strong jaw, and by the enormous development of the muscles of the cheek. In the small number of pectoral rays it resembles *L. polaris* Sabine, *L. murana* Collett, and *L. Verrillii* Goode & Bean.

DESCRIPTION.—Body elongate, rounded throughout its entire length; its greatest height (.06) equaling its greatest width (.06); the height behind the pectorals ($.05\frac{1}{2}$) very slightly greater than the width behind the pectorals ($.05\frac{1}{8}$); the width at the anus ($.04\frac{2}{3}$) exceeding two-thirds of the height ($.05\frac{2}{3}$) at the same place; midway from the anus to the tail the width (.03) equals three-fourths of the height ($.04\frac{1}{3}$). The greatest height is contained over sixteen times in the total length, and equals slightly more than one-fifth of the distance from the snout to the origin of the anal fin. The width of the body at the anus is about one-third of the length of the head.

The head much resembles in general form that of the common rattle-

snake (*Crotalus horridus*), having a broad flat top and an abrupt, almost overhanging, profile at the snout; the upper jaw extending far beyond the lower ($1\frac{1}{2}$ hundredths of length), the intermaxillary teeth being visible from below when the jaws are closed. This character, common to all species of *Lycodes*, is extraordinarily prominent in *L. parvillus*. The end of the maxilla extends behind the perpendicular from the posterior margin of the orbit, and the tip of the upper jaw curves strongly downward. The length of the upper jaw (.083) is contained twelve times in the length of the body, and is greater than the postorbital length of the head. The tip of the under jaw curves strongly upward, and is received entirely within the upper jaw. The distance from the tip of the snout to the articulation of the mandible (.10) equals one-third of the distance from the snout to the anal, and one-tenth of total length. The muscles of the cheeks are enormously developed and protuberant, the width of the head in this region (.08) equaling the length of its postorbital portion. The width of the interorbital area (.015) is less than half the diameter of the orbit (.035), which is equal to half the length of the pectoral fin (.07). The eyes are placed high, their upper margins approaching closely to the line of its upper profile, their diameter included about four times in the length of the head. The nostrils are situated nearly midway between the orbit and the tip of the snout.

Intermaxillary teeth in a single series; a few teeth in a second line behind the others, near the symphysis. Mandibular teeth in a single series, except at the symphysis, where there are a few (about 9) teeth in front of the main series. A few teeth clustered at the head of the vomer. On the palatines a single series, about six on each side. The teeth throughout are stouter than is usual in this genus, recurved and sharply pointed.

Dorsal fin inserted at a point less than one-fourth of the distance from the snout to the end of the tail, and very slightly behind the perpendicular from the tip of the extended pectoral.

Anal fin inserted in the perpendicular from the twelfth dorsal ray, at a point three-tenths of the distance from the snout to the end of the tail. The vent is in the vertical from the tenth dorsal ray, its distance from the snout equaling about four times the length of the pectoral.

The pectoral is inserted at a distance from the snout about equal to twice its own length.

The ventral is inserted at a distance from the snout equal to six times its own length, its tip extending back to the line of insertion of the pectoral.

Scales covering the whole body and extending far out on the bases of the dorsal and anal fins; head and pectoral fins scaleless.

The color was probably light brown in life.

Radial formula:—D. (including half of caudal), 116–117. A. (including half of caudal), 100. P., 16. V., 3.

Table of Measurements.

Current number of specimen	22, 177.	
Locality	{	Lat. 42° 48' N.
		Lon. 63° 07' W.
	Millime- tres.	100ths of length.
Extreme length.....	363	
Length to end of middle caudal rays.....	363	
Body:		
Greatest height.....		5 $\frac{2}{3}$
Greatest width.....		5 $\frac{1}{2}$
Greatest circumference.....		17 $\frac{1}{2}$
Height at ventrals.....		5 $\frac{1}{2}$
Head:		
Greatest length.....		14 $\frac{1}{2}$
Greatest width.....		8 $\frac{1}{2}$
Width of interorbital area.....		1 $\frac{1}{2}$
Length of snout.....		3 $\frac{2}{3}$
Length of postorbital portion of head.....		8
Length of upper jaw.....		8 $\frac{1}{2}$
Length of mandible.....		9
Diameter of orbit.....		3 $\frac{1}{2}$
Extent of gill-opening.....		4 $\frac{1}{2}$
Dorsal:		
Distance from snout.....		22
Anal from snout.....		28 $\frac{1}{2}$
Anal:		
Distance from snout.....		30
Pectoral:		
Distance from snout.....		14 $\frac{1}{2}$
Length.....		7
Ventral:		
Distance from snout.....		12
Length.....		2
Dorsal.....	116-117	
Anal.....	100	
Pectoral.....	16	
Ventral.....	3	

WASHINGTON, March 21, 1879.

DESCRIPTION OF A NEW SPECIES OF LIPARIS (L. RANULA) OBTAINED BY THE UNITED STATES FISH COMMISSION OFF HALIFAX, NOVA SCOTIA.

By G. BROWN GOODE and TARLETON H. BEAN.

An apparently undescribed species of *Liparis* was taken in the large trawl-net by the collecting party on the United States steamer Speedwell, September 24, 1877, off the mouth of Halifax Harbor (Station 117, 8 $\frac{1}{2}$ miles southeast from Chebucto Head). The depth at which it was found was 52 fathoms, the temperature at the bottom 35° F. The bottom was of fine sand and mud, and in the same haul of the net were taken the following species: *Glyptocephalus cynoglossus*, *Hippoglossoides platessoides*, *Sebastes marinus* (young), *Phycis chuss*, *Aspidophoroides monopterygius*, *Triglops Pingelii*, *Centridermichthys uncinatus*, and *Raia radiata*.

The species resembles, in the shape of its head, the *Liparis Fabricii* of Kröyer, but is easily distinguished by its less elongate body and the greater number of rays in the dorsal and anal fins. When first taken

it was colorless, almost translucent, and was covered with a thick tough integument. The following description is less complete than would seem desirable, owing to the fact that the unique specimen (No. 22,310, U. S. Nat. Mus. Cat.) was too soft and tender to admit of the requisite manipulation. The specimen, which is 56 millimetres in total length (caudal included), is a mature female, having in the abdominal cavity many large eggs.

DESCRIPTION.—The body is thick, subcylindrical anteriorly, rapidly tapering to the tail, covered with a thick lax integument; its greatest height (.25) equals the length of the head and is one-fourth of the total length of the body without caudal.

The head is somewhat tumescent at the nape; its height (over the ventral disc and eyes) contained something over six times in the length of the body; its greatest width (.18) very slightly greater and equaling twice the width of the ventral disc. The snout is broad, with prominent vertical profile; its length about one-fourth that of the head. The cleft of the mouth is horizontal, and does not extend to the perpendicular from the anterior margin of the orbit. The lips are covered with thick lax skin, the upper jaw extending beyond the lower.

The length of the upper jaw is about one-third of the length of the head; that of the mandible slightly greater than the length of the ventral disc. Each jaw armed with a band of villiform teeth. The tongue is thick, obtuse. The eye is lateral, not interfering with the upper profile of the head; its diameter (.07) more than one-fourth of the length of the head, and contained about fourteen times in the length of the body. The width of the interorbital area is contained two and one-half times in the length of the head. The nostril is close to the eye. The gill-opening is a vertical slit, extending upon the upper part of the root of the pectoral.

The dorsal fin is inserted at a distance from the snout equal to one-third of the length of the body. It contains about 48 rays, though to count them is almost impossible. The anal fin originates at a distance from the snout equal to two-fifths of the length of the body, and in the perpendicular from the eighth dorsal ray. It contains at least 48 rays. The pectoral fin is moderately broad, with 15 long rays and 12 or 13 shorter ones. The long rays are twice as long as the ventral disc and extend nearly or quite to the perpendicular from the vent.

The ventral disc is slightly longer (.10) than its distance from the snout (.09), which precisely equals its width. It has fourteen papillæ.

The color is uniform whitish, almost colorless, and translucent in life.

Table of Measurements.

Current number of specimen.....	22,310.	
Locality.....	Station 117, off Halifax.	
	Millime- tres.	100ths of length.
Length to origin of middle caudal rays.....	52	.....
Body:		
Greatest height.....		25
Height at ventral disc.....		17
Head:		
Greatest length.....		25
Greatest width.....		18
Width of interorbital area.....		10
Length of snout.....		6
Length of upper jaw.....		8
Length of mandible.....		11
Diameter of orbit.....		7
Dorsal:		
Distance from snout.....		32
Anal:		
Distance from snout.....		40
Caudal:		
Length of middle rays.....		(8)
Pectoral:		
Distance from snout.....		23
Length.....		20
Ventral:		
Distance of disc from snout.....		9
Length of disc.....		10
Width of disc.....		9
Dorsal.....	48	.....
Anal.....	(48)	.....
Pectoral.....	15+12 or 13	.....
Ventral (number of papillæ in disc).....	14	.....

WASHINGTON, March 22, 1879.

DESCRIPTION OF A NEW SPECIES OF AMBER FISH (*SERIOLA STEARNsii*) OBTAINED NEAR PENSACOLA, FLORIDA, BY MR. SILAS STEARNS.

By G. BROWN GOODE and TARLETON H. BEAN.

The National Museum has recently received, from Mr. Silas Stearns, of Pensacola, several species of fishes hitherto unrecorded from the Gulf of Mexico. Among them we recognize *Seriola bonariensis*, Cuv. & Val., previously observed only on the coast of Brazil, which is represented by an individual of 890 millimetres, catalogue-number 22258; also a second species of the same genus, which, though closely related to two Cuban species, has characters which distinguish it from them, or, at least, which do not harmonize with the published descriptions. This form may in the future prove to be identical with *Seriola gigas* or *Seriola dubia*; it appears to be as distinct from either of these species as they from each other. It is therefore fully described as a new species under the name *Seriola Stearnsii*. We prefer thus to place the Pensacola specimen on record as a provisional new species rather than to identify it on insufficient grounds with an already-named species, of which the published descriptions are incomplete. A study of a large series of specimens will doubtless largely reduce the number of species in this genus.

Seriola Stearnsii, sp. nov.

A *Seriola* with slightly compressed body, the height of which (.248) is equal to one-fourth of its total length to the end of the middle caudal rays, its width (.14) about one-seventh of the same. (The height of the body is contained about $4\frac{2}{3}$ times in the length to the end of the middle caudal rays.) Its shape sub-fusiform, with greatest height at the origin of the second dorsal fin, whence its dorsal and ventral profiles slope gently and gracefully, with about the same curve, to the snout and the base of the caudal, which are nearly equidistant from the point referred to; the circumference of the body (.64) nearly two-thirds of its total length; its height at the ventrals (.22) about five times the length of the third dorsal spine; its least height at the tail (.04) equal to one-sixth its greatest height; the distance from the end of the base of the second dorsal to the base of the superior caudal lobe (.07) one-half of the greatest width of the body. The caudal peduncle is somewhat depressed and has prominent transverse grooves above and below and moderate lateral carinae, the length of the prominent part of which is somewhat less than the length of the pectoral.

The length of the head (.28) is contained slightly more than $3\frac{1}{2}$ times in the length of the body and equals twice its own width (.14). The length of the snout (.10) is slightly greater than width of interorbital area (.095). Length of operculum (.07) slightly greater than half that of the upper jaw (.13) and slightly less than that of mandible (.15). The maxillary extends to the vertical through the middle of the eye, the mandible to that from its posterior margin. Diameter of eye (.04 $\frac{1}{2}$) contained about three times in the length of the upper jaw and about $6\frac{1}{3}$ times in the length of the head (diameter of iris 7 times in length of head). The distance of the eye below the dorsal profile equals about two-thirds of its own vertical diameter, which is the same as the greatest width of the posterior flange of the maxillary bone. (The centre of the eye is situated at a distance below the dorsal profile (.04) contained less than four times in the height of the head (.14 $\frac{1}{2}$) at that point. Compare with *S. gigas*.)

Intermaxillary teeth in a villiform band, broadest at the symphysis and decreasing in width to the end of the intermaxillary, which extends back nearly as far as the maxillary. Palatine teeth in a club-shaped patch, villiform. Vomerine teeth villiform, in an arrow-shaped patch, the length of which equals the short diameter of the eye, and its shape resembles that of the vomerine patch in *Rhomboplites*. Mandibular teeth similar to those on the intermaxillaries in form and arrangement. On the tongue a median and two lateral patches of villiform teeth.

The distance of the first dorsal from the snout (.35) is slightly more than one-third of the length of the body; the length of its base about twice the length of its third spine. Its insertion is over the middle of the base of the ventral. The origin of the second dorsal is slightly in advance of the middle of the body, or about equidistant from the snout

and the grooves on the top of the caudal peduncle; its length of base (.42) exceeds twice that of the anal (.20). The first and last dorsal spines are extremely inconspicuous, hidden beneath the skin, so that the fish at first appears to have only five spines. The length of the largest (third) spine is about equal to the diameter of the eye, and does not exceed one-fifth of the height of the body. The height of the second dorsal at its longest ray (.10) equals the length of the snout.

The insertion of the anal is under the middle of the second dorsal, and is distant from the snout somewhat more than four times the length of the mandible; its greatest height (.09) is slightly less than the width of the interorbital area; the length of its base (.20) twice that of the snout; the length of the last rays (.063) is one-tenth of the distance of the snout from the insertion of the fin.

The caudal is broad, the lobes slender, falcate, equal; their length (.21) about twice the distance from the termination of the median rays to the notches on the caudal peduncle (.11).

The insertion of the pectoral is posterior to the vertical from the origin of the first dorsal; its extremity reaches to the vertical from the posterior termination of the first dorsal; its length (.13) is contained less than eight times in that of the body and nearly nine times in the distance from the snout to the end of the caudal.

The ventrals are inserted under the origin of the first dorsal, at a distance from the snout (.295) equal to twice the length of the mandible; the length of the fin (.13) equal to that of the pectoral, its extremity reaching to the vertical from the insertion of the second dorsal, and to a distance in front of the anal equal to the diameter of the eye.

Radial formula: B. VII; D. VII, 1, 36; A. II, 1, 19; P. 19; V. 6.

Scales small, as in other members of the genus, present upon the cheeks, but not upon the limb of the preoperculum or the remainder of the head. Lateral line with many curves, straight upon the tail.

Color bluish above, whitish beneath, a band of greenish yellow as wide as the eye extending from the preopercle to the extremity of the tail. Fins greenish; traces of bands on the operculum.

The specimen sent by Mr. Stearns (No. 22325) measures 568 millimetres ($20\frac{1}{2}$ inches) to the end of the middle caudal rays, and weighs $6\frac{1}{2}$ pounds. Concerning the species, Mr. Stearns writes: "No. 116 is called here by the fishermen 'Amber fish,' and is quite common along this coast in the deeper waters, but as they do not bite freely, not many are taken. Those that are caught are taken near the surface, as the hook is descending. Throughout the year they are found near the coast, where they probably breed. The specimen sent is rather below the average size. By most people it is considered a fine food fish."

The name "Amber fish" is applied to the fishes of this genus by English-speaking colonies the world over. It alludes to the amber-colored stripe upon the side.

Table of Measurements.

Current number of specimen	22,325.	
Locality	Pensacola, Fla.	
	Millime- tres.	100ths of length.
Length to end of middle caudal rays	568	
Body:		
Greatest height		24.8
Greatest width		14
Greatest circumference		64
Height at ventrals		22
Least height of tail		4
Length of caudal peduncle		7
Head:		
Greatest length		28
Greatest width		14
Width of interorbital area		9.5
Length of snout		10
Length of operculum		7
Length of upper jaw		13
Length of mandible		15
Height of head through eye		14.5
Diameter of eye		4.5
Dorsal (spinous):		
Distance from snout		35
Length of base		8
Length of first spine		2.7
Length of second spine		3.9
Length of third spine		4.3
Length of fourth spine		3.2
Length of fifth spine		2.0
Dorsal (soft):		
Length of base		42
Length of first ray		4
Length of longest ray		10
Length of last ray		6
Anal:		
Distance from snout		63
Length of base		20
Length of longest ray		9
Length of last ray		6.3
Caudal:		
Length from notch on peduncle to end of middle rays		11
Length of external rays		21
Pectoral:		
Distance from snout		38.3
Length		13
Ventral:		
Distance from snout		29.5
Length		13
Branchiostegals	VII	
Dorsal	VII, 1, 36	
Anal	II, 1, 19	
Pectoral	19	
Ventral	6	

WASHINGTON, April 1, 1879.

ON THE BIRDS OF HELIGOLAND.

By H. GÄTKE.

HELIGOLAND, March 8, 1879.

Professor S. F. BAIRD,

Secretary Smithsonian Institution:

DEAR SIR: I have delayed answering your very kind communication till I might be able to inform you of the receipt of the box despatched

for me. It arrived two days ago, and many, many thanks for the contents thereof, which to me are very valuable indeed.

By this mail I shall send off a small box with skins, all I had, and, as I fear, of very little value to you. Perhaps the suite of *Sylvia succica*, Linn., may interest you, as the females and male in winter dress are perfectly reliable. The other form, *S. leucoeryanea*, Brehm, comes very rarely so far north as Heligoland, and the few instances it has turned up from four to six weeks earlier than the *succica* in spring. I have sent for your examination a skin of *Lanius major*, Pall., with the alar white mark extending over the bases of primaries only, and which I suppose, from what I see in Richardson and Swainson's "Faun. Bor. Amer.," is coincident with their *Lan. borealis*.* Perhaps we have here to deal with a case similar to that of *Alauda alpestris*, viz, a gradual extension westward from an originally American home. Up to October, 1847, *A. alpestris* was here an excessively rare appearance, known only to a very few sportsmen; but at the fall of that year there was a very great influx of birds from the east (*Xema sabinii* may be counted among the rest), and with these *A. alpestris* appeared in such numbers that one young man succeeded in shooting above a score during one afternoon. Ever since, this species has been a numerous and regular bird of passage during October and November of each successive year. I have packed for you a male and female, which, as coming from the westernmost point almost of their now regular line of migration, may be of some interest for the sake of comparing with the original stock.† I saw once a skin from America, an old male bird, which was of a rather intense brick-red color round the shoulders and wing-coverts, whereas these parts with our birds are always of a pinkish, vinaceous tinge. If the above coloration with your birds be the prevalent one I should like much the possession of such an old male specimen.‡ Amongst the Pipit suite there is one *Anthus richardi*, a regular autumnal visitant here, from the far east of Asia (Daouria),§ and if of interest to you I will next fall try to procure some more skins for you.

I am greatly gratified at finding that many points of your observations|| form already a part of my manuscript. Your remark that "if

* This specimen is not *L. borealis*, but seems referable to the *L. excubitor* of Europe.—R. RIDGWAY.

† The examples sent by Mr. Gütke resemble very closely in their robust build and dark colors the specimens usually obtained in eastern North America in winter, but have the yellow of the head more extended, this color in fact invading even the whole pileum. They can easily be matched, however, even in this respect from a large series.—R. RIDGWAY.

‡ The specimen here alluded to was very likely the var. *chrysolæma* of California and Mexico, which has, at all seasons, the vinaceous tints of the northern forms replaced by a rusty cinnamon color. (Conf. *Hist. N. Am. B.*, II, pp. 1411-44.)—R. RIDGWAY.

§ Do not these east Asiatic species cross over the Pacific from Kamtchatka via the Aleutian Islands?

|| Conf. "The Distribution and Migrations of North American Birds." *Am. Jour. Science & Arts*, XLI, 1866, 78-90, 184-192, 337-347.

a region be deprived of its spring birds" proves very strikingly the fact that over a wide range of latitude each individual resorts for propagation to the latitude where it was hatched; that birds quit their winter-quarters in succession as their individually more northerly home becomes habitable,—naturally the most northerly latest; and that, consequently, Middendorf's calculation of the rate of migration-flight must be fallacious, because the individuals he observed earlier in spring at a lower latitude were not the same he saw later not thirty degrees higher north, but were such as passed *over* the former, whilst they perhaps were beginning to construct their nests; therefore, the period that lay between observing the two could not be made use of as a measure whereby to determine their pace of flight or advance during a day.

That the direction of the course of wandering birds should be influenced by river courses or mountain chains, is a point which I do not agree to, at least so far as Europe comes under contemplation. Here during the fall, the route of miscellaneous species is so varied that the two principal hosts cross each other at right angles; one great mass progressing due west from the farthest east of Asia (e. g., *Anthus richardi*, *Sylvia superciliosa*), and continue their course to Heligoland, England, France, and Spain. Besides these, all the rare autumnal visitors come here from the far east of Asia, which proves that there must be with birds of these regions a strong inherent tendency to a western migration, even in species whose real winter-quarters are in the south of India down to the Sunda Isles, as, for instance, the two named above. This line of flight diverges abruptly to the north when approaching the Atlantic in England, Western France, and Spain; *vide* the immense numbers crossing the Straits of Gibraltar.

This westerly current is cut at right angles by another host coming simultaneously down from the extreme north of Europe and Asia, and steering due south for their winter-quarters, viz: The Willow Warblers, *Phylloscopus trochilus* and *rufus*, which go from the North Cape of Scandinavia to the Cape of Good Hope; *P. tristis* and *borcalis*, from Northern European and Asiatic Russia down to the south of India and China. The latter, together with *Falco rufipes*, *Motacilla citreola*, *Anthus cervinus*, *Emberiza aureola*, and *Linosa cinerea*, all plentifully breeding so close to Heligoland as the Onega Dvina, Megin, and Petchora districts, but still never, or very rarely, turning up here during their autumnal flights, proves in itself their southern course—without the least western inclination—even if they were not observed down the Ural, the Black Sea, Turkestan, &c. The most striking instance of such a move is seen in *Sylvia philomela*, which breeds in the south of Sweden, and, nevertheless, has been observed here but once during the last forty years!

A few can be pointed out as going from northeast to southwest, namely, *Sylvia succica* and the *Alauda alpestris*. These, and all the others enumerated, joined by hosts of the more common "million" which are spread far and wide over the entire northern Palearctic Region.

What, under such circumstances, becomes of the routes of birds by river courses or mountains? How many great rivers has *Anthus richardi* to cross, almost all at right angles, during his autumnal flight from Daouria to France and Spain?

I maintain that the migratorial movement, particularly the vernal one, when in normal progress, is performed by the great majority of birds far beyond the perception of man, and that what we see of the same are but the irregularities and interruptions thereof—brought about by atmospheric agencies.

Your opinion that the spring line of flight is widely different from that of the fall, I most completely participate in. All the different routes enumerated in the foregoing are dropped, and a more or less direct course toward the polar regions adopted. The wide front of the winter-quarters, extending from the west of Africa to the east of China, the Philippines, Borneo, &c., concentrating during this northerly passage to less than half its original stretch.

A proof of this latter assertion is rendered by the fact that of all the eastern birds which visit Heligoland during their autumnal migration, none appear during their return journey, the track to the south which terminated their western flight having brought them to far lower latitudes; while in spring, as they pursue a direct course to their northern breeding-grounds, they leave all these western countries to their left.

While the "rare birds" here during autumn are, without exception, eastern species, those of the spring are as uniformly from the southeast—Greece, Asia Minor, Turkestan, &c. Singular it is, that almost no exceptional bird has come here from the south or west, *i. e.*, so far as the Old World is concerned. In what eminent manner the "far west" is represented, I have told you at an earlier period.

And this leads me to the route which American birds follow to Europe. I do not much lean to the supposition that storms have in any considerable degree to do with such extra tours, and why Newton and others advance so strongly the Greenland, Iceland, &c., route, I cannot comprehend. I fancy they never contemplated the possibility of a bird coming in a direct line from Newfoundland to Ireland; in other words, that a bird might be able to sustain an uninterrupted flight sufficient to carry it across the Atlantic. My researches have led me to the belief that such is not alone far from being impossible, but that the probability of such a fact, wonderful as it may appear, is borne out by good evidence.

For instance, these old spring birds of these *Sylvia succica* which I send you, have wintered in the middle or north of Africa. During their vernal migration, the first point north thereof where they are regularly found in considerable numbers is Heligoland, whilst during this time they are of the utmost rarity in all countries intervening between the

Mediterranean and the North Sea, upper Germany not excepted. This fact incontestably proves that these birds cross this distance in one uninterrupted flight, and during one short spring night, viz, in 9 to 10 hours, which gives a rate of locomotion of 40 geographical miles per hour. Wonderful, incomprehensible, I admit, but still remaining a fact. The slow clumsy Royston Crow (*Corvus cornix*) crosses from here due west* over to England, at a rate of 27 geographical miles an hour, and results of 25 miles have been furnished by the semi-domesticated Carrier-pigeon. The distance from the north of Africa to Heligoland is equivalent to that from Newfoundland to Iceland, and therefore no objection whatever can be raised against your birds crossing over to us direct.

All this with plenty of evidence, and a great many points besides, is ready in manuscript sufficient to cover from fifty to sixty pages octavo print, and by the end of May I shall be ready for the press altogether.

I greatly count on your lenience, my dear sir, whilst allowing my pen to run on at such an unpardonable length, but perceiving from your contribution that you, like myself, have studied the grand theme of the migration in nature, which is quite a different matter from all learned treatises thereon worked out by the lamp of the studio, my hobby felt so comfortable in your genial company that it bolted off with this unresisting tide.

Begging once more to pardon my having ventured on your time and patience at such unpardonable length, in more or less objectionable English thereto,

I remain, dear sir, yours, very truly,

H. GÄTKE.

**DESCRIPTION OF ALEPOCEPHALUS BAIRDII, A NEW SPECIES OF FISH
FROM THE DEEP-SEA FAUNA OF THE WESTERN ATLANTIC.**

By G. BROWN GOODE and TABLETON H. BEAN.

The National Museum has recently received from Mr. Christian Johnson, of the schooner William Thompson of Gloucester, a single specimen of an undescribed species of *Alepocephalus* taken on the Grand Banks, at a depth of 200 fathoms. The only other known representative of this genus is the *Alepocephalus rostratus* Risso, a member of the

* During the fall this line of migration, so far as it comes under observation here, day or night, is from due east to west, sometimes perhaps with the declination of a point to the south.

Mediterranean fauna. The species is dedicated to the distinguished Secretary of the Smithsonian Institution.

DIAGNOSIS.—Body comparatively elongate, somewhat compressed, its greatest height, at a point midway between pectorals and ventral insertions, contained $5\frac{1}{3}$ times in its length to the origin of the middle caudal rays, its greatest width equal to one-tenth of total length, the least height of tail contained 11 times in length of body.

Scales large, thin, oblong, triangular at the free end, those at the base of the anal fin having the free end more produced than the others. Sixty-five scales in the lateral line, seven rows between it and the origin of the dorsal, eleven between that of the anal and the lateral line. Scales extend for a short distance upon the bases of the dorsal and anal fins.

Head moderately compressed, snout subconical, the lower jaw included within the upper when the mouth is closed. The length of the head is contained $4\frac{1}{3}$ times in length of body, slightly exceeding twice the length of the lower jaw. Width of the head equal to the length of the operculum and very slightly less than that of the upper jaw. Width of interorbital area half of the least height of tail. Length of snout half that of the mandible, which is one-ninth of the total length. Diameter of orbit equal to length of snout.

Dorsal inserted directly above the vent, slightly in advance of the anal and at a distance from the snout nearly equal to two-thirds of the total length of the body.

Length of longest ray of dorsal one-half that of the postorbital portion of the head. The distance of the anal from the snout is almost three times the length of the head, its first ray being about under the fourth ray of the dorsal. Its length of base is greater than that of the dorsal by one-fifth of the length of the latter; its longest ray slightly exceeds the longest of the dorsal.

Middle caudal rays equal in length to longest ray of anal, the external rays somewhat more than twice as long.

Distance of pectoral from snout three times as great as the least height of the tail; its length one-tenth of total length and equal to width of body, reaching to ninth row of scales.

Distance of ventral from snout equal to twice the length of the head, its length slightly greater than that of middle caudal rays.

Radial formula: B. VI. D. 22. A. 25. C. 19. P. 12. V. 1, 9. Cæc. Pyl. 15.

Teeth on the intermaxillaries, mandible, and palatines.

Color.—Uniform indigo-blue, this color extending to the inside of the mouth and the gill-membranes.

Table of Measurements.

Current number of specimen	22,468.	
	Milli- metres.	100ths of length.
Length to origin of middle caudal rays	610	.....
Body:		
Greatest height		19
Greatest width		10
Height at ventrals		18½
Least height of tail		9
Head:		
Greatest length		23½
Greatest width		8½
Width of interorbital area		4½
Length of snout		5½
Length of operculum		8½
Length of upper jaw		8½
Length of mandible		11
Distance from snout to orbit		5½
Diameter of eye		5½
Dorsal (spinous):		
Distance from snout		65
Length of base		15½
Length of longest ray		6
Anal:		
Distance from snout		68½
Length of base		18½
Length of longest ray		6½
Caudal:		
Length of middle rays		6½
Length of external rays		14
Pectoral:		
Distance from snout		27
Length		10
Ventral:		
Distance from snout		48
Length		63
Branchiostegals	VI	.....
Dorsal	22	.....
Anal	25	.....
Caudal	19	.....
Pectoral	12	.....
Ventral	1, 9	.....
Number of scales in lateral line	65	.....
Number of transverse rows above lateral line	7	.....
Number of transverse rows below lateral line from origin of ventral	11	.....
Number of caecal appendages	15	.....
Vent:		
Distance from snout		65

WASHINGTON, April 25, 1879.

ON THE SPECIES OF *ASTROSCOPUS* OF THE EASTERN UNITED STATES.

By TARLETON H. BEAN.

The family *Uranoscopidae* of Gill has two representatives on the east coast of the United States, *Astroscoptes y-gracum* (C. & V.) Gill, and *A. anoplus* (C. & V.) Brevoort. The former was described from the Caribbean Sea, and is now for the first time recorded in our waters. *A. anoplus* was founded upon young individuals sent by Professor LeConte, and the immaturity of the specimens has led to considerable confusion in the diagnoses of genera. Cuvier and Valenciennes supposed the species to be scaleless. Drs. Gill and Günther both employed this as one of the characters separating it from *Uranoscoptes*, the latter in 1860* assigning the *U. anoplus* of Cuvier and Valenciennes to his new genus,

* Cat. Fish. Brit. Mus. ii, 1860, p. 229.

Agnus, with the distinguishing characters of a naked body and the absence of a filament in the mouth. Dr. Gill, in 1861,* used the same characters in transferring the same species from *Uranoscopus* to *Astroscopus* of Brevoort, adding some particulars as to the mauling of the head and the armature of the preoperculum. The species, in fact, is covered with scales, which in the young are inconspicuous, but in the adult may be readily counted. The genus *Astroscopus*, however, is well separated from *Uranoscopus*, and may be thus defined:

ASTROSCOPUS Brevoort.

Uranoscopus sp. CUV. & VAL., Hist. Nat. Poiss., viii, 1831, p. 493.

Astroscopus BREVOORT, Proc. Phila. Acad. Nat. Sci., Jan. 1860, p. 20.—GILL, op. cit., 1861, p. 113.

Agnus GÜNTHER, Cat. Fish. Brit. Mus., ii, 1860, p. 229.

Upselonphorus GILL, op. et loc. cit.

Head above with its crown covered with a bony plate, from the middle of the anterior margin of which arises a y-shaped apophysis, the limbs of which extend to the orbits. Postocular region covered only with skin.

Preoperculum with two blunt processes † generally radiating from the angle of its anterior limb, one of which is directed downwards and forwards. Humeral spine inconspicuous. Lower jaw entire beneath. Lips furnished with numerous filaments. No spines before the ventrals.‡ No intralabial filament. Head and belly without scales; the rest of the body covered with small scales. Two dorsal fins; the first composed of four short spines, the second about equal to the anal.

1. *Astroscopus y-græcum* (Cuv. & Val.) Gill.

Uranoscopus y-græcum CUV. & VAL., Hist. Nat. Poiss., iii, 1829, p. 303.—GÜNTHER, Cat. Fish. Brit. Mus., ii, 1860, p. 229.

Astroscopus y-græcum GILL, Proc. Acad. Nat. Sci. Phila., xii, 1860, p. 21.

Upselonphorus y-græcum GILL, op. cit., xiii, 1861, p. 113.

There are now two specimens of this species in the National Museum, one (No. 18044) taken in the Saint John's River, Florida, by Prof. S. F. Baird, April 2, 1877; the other (No. 18029) collected in the Matanzas River Inlet, Florida, by Mr. Joseph C. Willetts, in February, 1877. In a collection of color-sketches of fishes made for Prof. Louis Agassiz, and now lent by the Museum of Comparative Zoölogy to the National Museum, are illustrations of *A. y-græcum* from Hampton Roads, Va., Charleston, S. C., and Pensacola, Fla.

DESCRIPTION.—The greatest height of the body (.26) equals twice the length of the operculum (.13). Its greatest width (.24) equals the height at the ventrals (.24), and the distance of the ventrals from the snout (.24). The least height of the tail (.10) is contained 10 times in the total length, and equals the distance between the eyes (.10). The length of the caudal peduncle (.08) equals that of the last anal ray (.08), and is contained $12\frac{1}{2}$ times in the total length.

* Proc. Phila. Acad. Nat. Sci., 1861, p. 113.

† More marked in *A. anoplus* than in *A. y-græcum*.

‡ These are present in *Uranoscopus scaber* and *U. asper*, and probably in all species of *Uranoscopus*. I am not aware that this has been previously mentioned.

The greatest length of the head (.37) slightly exceeds the distance of the spinous dorsal from the snout (.36). The length of the postocular depression (.11) equals more than 3 times the length of the snout (.03½), and is contained about 9 times in the total length. The width of this depression (.07½) equals about $\frac{2}{3}$ of its length. The greatest width of the head (.28) equals 4 times the length of the second dorsal spine (.07). The jaws are shorter than in *A. anoplus*. The length of the upper (.15½) equals half the length of the anal base (.31), and is contained 6½ times in the total length (less than 6 times in *A. anoplus*). The length of the mandible (.21) is contained 4½ times in the total length. The maxilla extends to a perpendicular, drawn at a distance behind the eye equal to the short diameter of the eye, and the mandible ends in the same vertical. The long diameter of the eye (.03) equals half the length of the last ray of the second dorsal (.06).

The distance of the spinous dorsal from the snout (.36) is a little less than the greatest length of the head (.37). The length of its base (.11) is contained 9 times in the total length, and equals the length of the postocular depression. The spines are all longer than in *A. anoplus*. The length of the first (.07½) is nearly ½ the length of the upper jaw, and slightly exceeds that of the second (.07), which equals $\frac{1}{3}$ of the length of the mandible. The last spine (.02½) is $\frac{1}{3}$ as long as the first. The length of the base of the second dorsal (.30) is contained 3½ times in the total length, and equals 3 times the distance between the eyes. Its longest ray (.19½) equals somewhat more than half the length of the head (much less than half in *A. anoplus*). The length of the last ray (.06) equals the distance from the snout to the orbit (.06).

The distance of the anal from the snout (.57) equals nearly 3 times the length of the longest dorsal ray. Its length of base (.31) is almost equal to that of the second dorsal. The first ray (.04) is half as long as the last (.08); the longest (.14½) is contained nearly 4 times in the distance from the snout to the origin of the anal, and nearly 7 times in the total length.

The length of the middle caudal rays (.25) equals $\frac{1}{4}$ of the total length. The length of the external rays (.23) equals that of the ventral (.23).

The distance of the pectoral from the snout (.35½) equals 5 times the length of the second dorsal spine. Its length (.30½) equals 5 times that of the last dorsal ray. It extends to the fourth anal ray.

The distance of the ventral from the snout (.24) does not greatly exceed its length (.23), and is equal to the height of the body at the ventrals (.24). The ventral extends to about the origin of the spinous dorsal. The vent is under the anterior rays of the second dorsal.

Radial formula: B. VI; D. IV, 14; A. 13; P. 19-20; V. 6. L. lat. ca. 80.

COLOR.—*Astroscoptes y-gracum* has, on the upper parts, numerous white spots, some of which are as long as the short diameter of the eye.

NOTE.—In the tables of measurements the unit of length is the length of body to the origin of the middle caudal rays.

Table of Measurements.

Species, *Astroscopus y-gracum*.

Current number of specimen	18,029.		18,044.		Aver- ages.
Locality	{ Matanzas River Inlet, Florida.		{ Saint John's River, Florida.		
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	100ths of length.
Extreme length	318		165		
Length to origin of middle caudal rays	253		131		
Body:					
Greatest height		24½		28	26
Greatest width		24		24½	24
Height at ventrals		24		24½	24
Least height of tail		10		10½	10
Length of caudal peduncle		7½		8	8
Head:					
Greatest length		37		37½	37
Length of occipital depression		12		10½	11
Width of occipital depression		6½		8½	7½
Greatest width		27½		28	28
Width of interorbital area		10		9½	10
Length of snout		3½		3½	3½
Length of operculum		12½		13	13
Length of maxillary		15		16	15½
Length of mandible		21		21½	21
Distance from snout to orbit		6		6	
Diameter of orbit		2½		3½	3
Dorsal (spinous):					
Distance from snout		35		37	36
Length of base		10½		11	11
Length of first spine		7½		7½	7½
Length of second spine		7		7	7
Length of last spine		2		3	2½
Dorsal (soft):					
Length of base		30		30½	30
Length of first ray		7			
Length of longest ray		18		21	19½
Length of last ray		6		6	6
Anal:					
Distance from snout		58½		55	57
Length of base		31½		30	31
Length of first ray		4		4	4
Length of longest ray		14		15	14½
Length of last ray		8½		7	8
Caudal:					
Length of middle rays		24½		26	25
Length of external rays		25½		22	23
Pectoral:					
Distance from snout		35		36	35½
Length		32		29	30½
Ventral:					
Distance from snout		25		23	24
Length		22½		23	23
Branchiostegals	VI		VI		
Dorsal	IV, 14		IV, 14		
Anal	13		13		
Caudal	16				
Pectoral	20		19		
Ventral	6		6		
Number of scales in lateral line	ca. 80				

2. *Astroscopus anoplus* (C. & V.) Brevoort.

Uranoscopus anoplus CUV. & VAL., Hist. Nat. Poiss., viii, 1851, p. 493, (described from young specimens sent by Prof. LeConte): DEKAY, Nat. Hist. N. Y., Fishes, 1842, p. 37, pl. xxii, fig. 65: STORER, Syn. Fishes N. A., 1846, p. 46 ("South Carolina, LeConte"); Mem. Amer. Acad., ii, p. 298.

Astroscopus anoplus GILL ex BREVOORT MSS., Proc. Acad. Nat. Sci. Phila., xii, Jan. 1860, p. 20; xiii, May, 1861, p. 114; Cat. Fishes E. Coast N. A., 1861, p. 43; Rep. U. S. Com. Fish., 1873, p. 798: YARROW, Proc. Acad. Nat. Sci. Phila., 1877, p. 207: JORDAN & GILBERT, Proc. U. S. Nat. Mus., i, 1879, p. 372.

Agnus anoplus GÜNTHER, Cat. Fish. Brit. Mus., ii, 1860, p. 229.

Astroscoptes guttatus ABBOTT, Proc. Acad. Nat. Sci. Phila., xii, 1860, p. 365. pl. vii: GILL, Cat. Fish. E. Coast N. A., Jan. 1861, p. 43.

Upselonphorus guttatus GILL, Proc. Acad. Nat. Sci. Phila., xiii, 1861, p. 113.

The U. S. National Museum has specimens of *A. anoplus* from Tompkinsville, N. Y., Norfolk, Va., and from an unknown locality. The list is as follows:

10761	Young....	Tompkinsville, N. Y. .	Charles Copley.
4622 <i>a</i>	Adult.....	Norfolk, Va.....	
4622 <i>b</i>	...do .....	...do	
7304	(7 specs.)..	United States?.....	

DESCRIPTION.—The shape of the body is similar to that of *Uranoscopus scaber*. Its greatest height (.29), which is at the origin of the spinous dorsal, is contained 4 times in its length in the young and $3\frac{1}{4}$ times in the adult. The greatest width of body (.24 $\frac{1}{2}$) is nearly $\frac{1}{4}$ of the length, and equals the length of the ventral (.24 $\frac{1}{2}$). The height at the ventrals (.27) equals three times the distance from the snout to the centre of the eye (.09). The least height of the tail (.11) equals the width of the interorbital area (.11), and is contained 9 times in the total length.

The length of the head (.39) equals 3 times the length of the operenulum (.13). There are two postocular depressions, whose length (.07 $\frac{1}{2}$) equals their width (.07 $\frac{1}{2}$), or slightly less than twice the length of the snout (.04). The greatest width of the head (.31) equals nearly 3 times the least height of the tail. The length of the upper jaw (.17) is contained nearly 6 times, and of the mandible (.23) $4\frac{1}{3}$ times in the total length. The long diameter of the eye (.03 $\frac{1}{2}$) equals $\frac{1}{4}$ the length of the longest anal ray (.14), and $\frac{1}{11}$ of the length of the head.

The distance of the spinous dorsal from the snout is about $\frac{3}{8}$ of the total length. The length of its base (.12) equals twice the length of its first spine (.06). The spines are all shorter than in *A. y-gracum*. The second spine equals the first, and 3 times the last (.02). The length of the base of the second dorsal (.30) equals 6 times the length of its last ray (.05). The first ray equals the first spine in length. The longest ray (.16 $\frac{1}{2}$) is contained 6 times in the total length.

The distance of the anal from the snout (.60) equals twice the length of the second dorsal base (.30), and nearly twice the length of the anal base (.31). The first anal ray (.04) equals the snout in length. The longest (.14) slightly exceeds in length the operenulum, while the last (.07 $\frac{1}{3}$) about equals the length of the postocular depression.

The length of the middle caudal rays (.23 $\frac{1}{2}$) is usually a little less than that of the ventral (.24 $\frac{1}{2}$).

The distance of the pectoral from the snout (.36) equals 3 times the length of the base of the spinous dorsal. The length of the pectoral (.29) exceeds the length of the ventral (.24 $\frac{1}{2}$) by about $\frac{1}{6}$ of the length of the latter, and is contained nearly $3\frac{1}{2}$ times in the total length. It extends to the 5th anal ray.

The distance of the ventral from the snout ($.25\frac{1}{2}$) slightly exceeds its length. The ventral extends to a vertical through the anterior part of the first dorsal.

Radial formula: B. VI; D. IV-V, 13-14; A. 12-13; C. 16-18; V. 6. L. lat. ca. 113.

The lateral line begins about the middle of the operculum, ascends backward to near the upper outline of the body, under the anterior half of the first dorsal, follows the upper outline close to the bases of the rays as far as the end of the second dorsal, from which point it curves downward to the origin of the middle caudal rays, and thence follows the origin of the bases of the lower caudal rays.

COLOR.—*Astroscoptes anoplus* is minutely spotted with white on the upper parts.

NOTE.—In the measurement tables the unit of comparison is the length to the origin of the middle caudal rays.

Table of Measurements.

Species, *Astroscoptes anoplus*.

Current number of specimen.....	10,761.		"Guttatus," 4,622 a.		"Guttatus," 4,622 b.		Aver- ages.
Locality.....	Tompkinsville, N. Y.		Norfolk, Va.		Norfolk, Va.		
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	100ths of length.
Extreme length.....	112		273		275		
Length to origin of middle caudal rays.....	91		221		220		
Body:							
Height at first dorsal.....		25		31		31	29
Greatest width.....		23		25		25½	24½
Height at ventrals.....		26		28		27	27
Least height of tail.....		11		11		11	11
Length of caudal peduncle.....		7		11		11	
Head:							
Greatest length.....		38		39		39	39
Length of occipital depression.....		7		8			7½
Width of occipital depression.....		7		8			7½
Greatest width.....		30		31		32	31
Width of interorbital area.....		10		11		11½	11
Length of snout.....		4		4		4	4
Length of operculum.....		13		13		13	13
Length of maxillary.....		17		17		16½	17
Length of mandible.....		23		22		23	23
Distance from snout to centre of orbit.....		9		9		9	9
Diameter of orbit.....		4		3		3½	3½
Dorsal (spinous):							
Distance from snout.....		38		36		38	37
Length of base.....		11		12		12	12
Length of first spine.....		6		6		6	6
Length of second spine.....		6		6		*5½	6
Length of last spine.....		2		1½		1½	2
Dorsal (soft):							
Length of base.....		31		30		30	30
Length of first ray.....		5		6		6½	6
Length of longest ray.....		17		16		16½	16½
Length of last ray.....		5		5		5	5
Anal:							
Distance from snout.....		58		60		62	60
Length of base.....		29		33		30	31
Length of first ray.....		4		4		5	4
Length of longest ray.....		14		13		14	14
Length of last ray.....		6		8		8	7½
Caudal:							
Length of middle rays.....		23		23		24½	23½

* Broken.

Table of Measurements—Continued.

Current number of specimen.....	10,761.		"Guttatus," 4,622 a.		"Guttatus," 4,622 b.		Aver- ages.
Locality.....	{ Tompkinsville, N. Y.		Norfolk, Va.		Norfolk, Va.		
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	100ths of length.
Pectoral:							
Distance from snout.....		34		37		37	36
Length.....		29		28		29	29
Ventral:							
Distance from snout.....		24		27		25½	25½
Length.....		25		24		24½	24½
Branchiostegals.....	VI		VI		VI		
Dorsal.....	IV, 14		V, 13		V, 14		
Anal.....	12		13		13		
Caudal.....	16-17		18		18		
Pectoral.....	19		20		20		
Ventral.....	6		6		6		
Number of scales in lateral line.....			113+				

WASHINGTON, May 6, 1879.

ON THE OCCURRENCE OF *HIPPOGLOSSUS VULGARIS*, FLEM., AT UNALASHKA AND ST. MICHAEL'S, ALASKA.

By TABLETON H. BEAN.

No one has yet positively identified the halibut of the Pacific coast of North America with the *Hippoglossus vulgaris* of Fleming, so far as I can learn. Ayres, in 1854,* writing of the species observed in the market of San Francisco, says: "The great *Hippoglossus vulgaris*, universally known as the 'halibut,' the fishermen have assured me is sometimes caught near the Farallon Islands. Most of those sold in our market, however, if not all, are brought from the coast further north." In volume 2 of the same Proceedings (1859, p. 30), he writes: "Another species, in which the eyes are on the right side, is occasionally taken near the Farallon Islands, opposite the mouth of the Bay, which I do not feel warranted in separating from *H. vulgaris*, without a direct comparison of the two. Its fin-rays are D. 102, A. 73, P. 16, V. 6, C. 4, 1, 7, 8, 1, 4.

"It appears to be seldom quite as large as *H. californicus*."

The number of anal rays in this enumeration is smaller than usual, but not improbable.

Lord† gives a graphic account of the Indian mode of fishing for halibut, and remarks as to the species: "I believe the species to be the *Pleuronectes hippoglossus* of Linnaeus, but of this I am by no means perfectly clear, as I had only an opportunity of examining this single specimen, that I estimated as weighing over 300 lbs.; and it was quite impossible to investigate its specific character," &c.

* Proc. Cal. Acad. Sci., i, 1854, 1st ed., p. 41, and 2d ed., p. 40.

† Naturalist in Vancouver Island and British Columbia, i, 1863, p. 149.

Dr. Cooper, in mentioning the Pleuronectoids of California, says: * "The two first are species of Halibut, one closely resembling the Atlantic fish, and grow over 4 feet long, the latter (No. 105, *H. vulgaris*?) sometimes weighing five hundred or six hundred pounds. Both are caught near San Francisco."

Mr. William H. Dall, in his work on "Alaska and its Resources," 1870, p. 484, states, that "The halibut are smaller than those of the eastern fisheries, but near Sitka and along the coast they have been taken from three to five hundred pounds in weight. They are not found north of the ice line in Bering sea, except, perhaps, in summer." In the report for 1870 of the Commissioner of Agriculture, p. 381, the same author employs the name "*Hippoglossus vulgaris*?" in connection with the paragraph on the halibut, and states that "Their range is from the Aleutian Islands southwest to Cape Flattery. . . . They extend westward into the Ochotsk sea with the cod and already form an article of commerce among the west-coast fishermen. They are said to surpass the eastern halibut in flavor when properly cured."

Mr. Henry W. Elliott, special agent of the Treasury Department, speaks thus of the halibut in a Report upon the Condition of Affairs in the Territory of Alaska, Washington, 1875, p. 167:

"Found throughout the territory on soundings south of the 60th parallel of north latitude. Halibut are quite abundant and of excellent quality, but the climate is such that the fishermen cannot properly dry or cure them for exportation even in small cargoes. They are, however, not abundant enough for exportation, and must therefore be regarded as only of local importance."

In a report upon the Customs District, Public Service, and Resources of Alaska Territory by William Gouverneur Morris, special agent of the Treasury Department, 1879, p. 115, is found the following information:

"While I was at Klawack, they were testing the boiler, new machinery, and other apparatus, and were trying the experiment of canning clams and halibut, both of which are so plenteous in that neighborhood as to be a perfect drug. I have since seen the result of this, and can pronounce the clams the very best so treated on the whole Pacific coast, and the halibut is of superior quality, preserving its flavor better than any yet produced from any other locality. The supply of these two articles of commerce alone, from this particular place, is only to be regulated by the demand."

The only examples of the Pacific halibut in the United States National Museum are those collected by Mr. W. H. Dall and Mr. Lucien M. Turner. Mr. Dall's is the single available one for comparison, and that lacks the caudal fin, which is fortunately present in the other. Although both specimens are in very poor condition, there is no difficulty in perceiving their identity with the Atlantic halibut. The individual forwarded by Mr. Dall (collector's number 1098, museum number 22466)

* Cronise's Nat. Wealth Cal., 1868, p. 493.

was taken at Unalashka, September 13, 1873, in 50 or 60 fathoms. Mr. Dall informed me that Dr. Steindachner saw it in San Francisco, and considered it identical with the *Hippoglossus vulgaris*. I have compared it carefully with Atlantic halibut from Eastport, Me., and fail to see any means of separating the two. The Alaska individuals are a little thicker; but that may be accounted for by the differences in the food supply. It is very desirable to have perfect specimens of the Pacific fish for examination; but, in the absence of such material, I have endeavored to make the most of what the museum has, and it is believed that the table of measurements will serve to confirm the views of those who regard the halibut of the Pacific identical with that of the Atlantic.

DESCRIPTION OF THE UNALASHKA SPECIMEN.

The museum catalogue number is 22466, and the collector's number 1098. The length of the fish to the origin of the middle caudal rays is 463 millimetres. The different proportions of the body are given in hundredths of this length.

The greatest height of the body (.32) is 4 times the length of the operculum (.08); its height at the ventrals (.25) is contained 4 times in the total length, and equals the distance of the pectoral from the snout (.25). The least height of the tail (.07½) is nearly equal to the length of the operculum (.08), and to the distance of the dorsal from the snout (.08). The length of the caudal peduncle (.12) equals that of the longest anal ray (.12). The lateral line follows the same course as in Eastern specimens.

The greatest length of the head (.25½) is contained nearly 4 times in the total length. The distance between the eyes (.03) equals ½ the distance from the snout to the orbit (.06). The length of the snout (.04½) equals almost ½ the length of the upper jaw (.09½). The length of the upper jaw is not quite equal to that of the pectoral of the blind side (.10). The maxilla extends to the vertical through the middle of the lower eye.

The length of the mandible (.11½) is contained 2¼ times in the length of the head. It extends to the vertical through the posterior margin of the lower eye.

The long diameter of the upper eye (.05) is contained 5 times in the length of the head, and twice in that of the pectoral of the blind side. The teeth agree perfectly in all respects with those of the Eastport individuals, that is, they are arranged in two series in the upper jaw, the outer being the stronger, and in a single series in the lower jaw.

The distance of the dorsal from the snout (.08) equals the length of the operculum. Its longest ray (.11½) does not quite equal the longest of the anal (.12). The 37th and 38th dorsal rays are the longest.

The distance of the anal from the snout (.34) equals ⅔ of the head's length. Its longest ray, the 17th, (.12) is contained 8½ times in the total length.

The tail is wanting in this individual, but present in that forwarded by Mr. Turner. It is of the usual *vulgaris* type.

The distance of the pectoral from the snout (.25) equals twice the length of the pectoral of the eyed side (.12½) and 2½ times that of the blind side (.10).

The distance of the ventral from the snout (.25) is contained 4 times in the total length. The length of the ventral (.05½) is contained 4½ times in that of the head.

The fin-rays are : D. 96. A. 77. P. II, 15. V. 6.

The radial formulæ of all the specimens are here summarized :

22466. Unalashka.	D. 96; A. 77; P. II, 15; V. 6; C. —.
22467. St. Michael's.	D. 100+; A. 78; P. II, 16; V. 6; C. + 16 +.
10439. Eastport, Me.	D. 103; A. 78; P. II, 14; V. 6; C. + 16 +.
14622. Eastport, Me.	D. 103; A. broken; P. II, 14; V. 6; C. + 16 +.

Table of Measurements.

Current number of specimen	22,466.		10,439.		14,622.		22,467.
Locality.....	Unalashka, Sept. 13, 1873.		Eastport, Maine.		Eastport, Maine.		Saint Michael's, Alaska.
	Milli-metres.	100ths of length.	Milli-metres.	100ths of length.	Milli-metres.	100ths of length.	Milli-metres.
Extreme length			427		428		
Length to origin of middle caudal rays	463		365		370		
Body:							
Greatest height		32		34		36	
Greatest width		8½		7		7½	
Height at ventrals		25		28		29	168
Least height of tail		7½		7½		8	
Length of caudal peduncle		12		12½		13	
Head:							
Greatest length		25½		27		26½	167
Greatest width							45
Width of interorbital area		3		3	ca. 3		15
Length of snout		4½		4½		4½	26
Length of operculum		8		8		8	48
Length of upper jaw		9½		10		9½	59
Length of mandible		11½		12½		11½	74
Distance from snout to orbit		6		5½		5½	
Diameter of upper eye		5		5½		5½	23
Dorsal:							
Distance from snout		8		7½		7½	46
Length of longest ray		11½		11		10½	68
Anal:							
Distance from snout		34		34		36	
Length of longest ray		12		11		11	70
Caudal:							
Length of middle rays				12½		12½	68
Length of external rays				18½		18½	115
Pectoral:							
Distance from snout		25		25½		25	
Length, eyed side		12½		13½		11½	77
Length, blind side		10		10		10	
Ventral:							
Distance from snout		25		26		26	
Length		5½		6		5½	
Dorsal	96		103		103		100
Anal	77		78		(Broken.)		78
Caudal			+ 16 +		+ 16 +		II, 16, 11
Pectoral	II, 15		II, 14		II, 14		II, 16
Ventral	6		6		6		
Length of pectoral of blind side							62

**DESCRIPTION OF AN APPARENTLY NEW SPECIES OF GASTERO-
OSTEUS (G. ATKINSII) FROM THE SCHOODIC LAKES, MAINE.**

By TARLETON H. BEAN.

In a large collection of fishes sent to the United States National Museum, in 1878, by Mr. C. G. Atkins, an assistant of the United States Fish Commission, were six specimens of a stickleback which appears to be undescribed, and for which I propose the name given above, as a slight recognition of Mr. Atkins's services as a collector and as an original investigator into the reproductive habits of important fishes.

Gasterosteus Atkinsii resembles in form and coloration *G. pungitius* rather than the perhaps more closely related *G. aculeatus*. It may be at once distinguished from all the other eastern American species by (1) the presence of about fifteen lateral plates, which rapidly diminish in size after the fourth, and (2) its long ventral spines, which nearly or quite reach the vent. The plates are quite unlike those of *G. semiarmatus*, being so thin and posteriorly so small that they are inconspicuous.

For the purpose of description I have selected the individual whose catalogue-number is 22492 a (collector's number, 3013). The extreme length of this specimen is 35 millimetres, and its length to the origin of the middle caudal rays is 30 millimetres, which is the basis of comparison for all the other measurements.

The height of the body at the ventrals (.21) equals 3 times the length of the upper jaw (.07), and 3 times the distance between the eyes (.07). Its greatest width (.11) equals the long diameter of the orbit (.11). The least height of the tail (.04) equals the length of the antecedent anal spine (.04) and one-half the length of the snout (.08). The length of the caudal peduncle (.13) somewhat exceeds the width of the head (.12).

The length of the head (.31) equals 3 times the length of the mandible (.10). The length of the snout equals that of the operculum (.08). The length of the upper jaw (.07) equals the distance between the eyes and one-half the length of the post-pectoral plate (.14). The length of the mandible (.10) is contained 10 times in the total length and equals twice the length of the antecedent spine of the second dorsal (.05). The long diameter of the orbit is contained $2\frac{3}{4}$ times in the length of the head and 9 times in the total length.

The teeth are as in the other members of the family.

The spinous dorsal has two spines of equal length. Its distance from the snout (.37) equals slightly more than twice the length of the pectoral (.18). The length of the two spines (.12) equals that of the first and longest ray of the second dorsal (.12) and of the anal (.12). The spines are in a straight line, and with each is connected a delicate membrane.

The distance of the anal from the snout (.66) equals 6 times the long diameter of the orbit. Its length of base (.18) equals $2\frac{1}{4}$ times the length of the operculum. The length of the antecedent anal spine (.04) is contained 3 times in that of the first and longest ray (.12).

The length of the middle caudal rays ($.16\frac{2}{3}$) is contained 6 times in the total length.

The caudal is slightly forked, almost truncate when expanded.

The pectoral is composed of ten rays. Its distance from the snout (.34) is a little less than twice its length (.18). It extends to the middle of the interval between the two dorsals. The length of the post-pectoral plate (.14) equals twice that of the upper jaw, and its width (.04) equals the length of the antecedent anal spine.

The ventral consists of one spine and one ray. Its distance from the snout (.45) equals $4\frac{1}{2}$ times the length of the lower jaw. The spine extends beyond the end of the pubic bones, reaching almost or quite to the vent. Its length (.19) exceeds that of the pectoral (.18). It is very strongly serrated on its outer and finely on its inner margin. The origin of the ventral is slightly in advance of the perpendicular let fall from the second dorsal spine.

Radial formula: B. III; D. II, I, 10-12; A. I, 8-9; C, + 12 +; P. 10; V. I, 1.

Color.—Dark bands cross the body just as in *G. pungitius*, which it strongly resembles. The ground-color of the body in the alcoholic specimens is almost flesh-color; the major part of the head is silvery, as are the breast and the belly.

Table of Measurements.

Current number of specimen.....	22,492 a.	
Locality	Schoodic Lakes, Me.	
	Millime- tres.	100ths of length.
Extreme length.....	35	.....
Length to origin of middle caudal rays.....	30	.....
Body:		
Greatest height.....		21
Greatest width.....		11
Height at ventrals.....		21
Least height of tail.....		4
Length of caudal peduncle.....		13
Head:		
Greatest length.....		31
Greatest width.....		12
Width of interorbital area.....		7
Length of snout.....		8
Length of operculum.....		8
Length of upper jaw.....		7
Length of mandible.....		10
Distance from snout to orbit.....		8
Diameter of orbit.....		11
Dorsal (spinous):		
Distance from snout.....		37
Length of first spine.....		12
Length of second spine.....		12
Dorsal (soft):		
Length of antecedent spine.....		5
Length of first ray.....		12
Anal:		
Distance from snout.....		66
Length of base.....		18
Length of first spine.....		4
Length of first ray.....		12
Length of longest ray.....		12
Caudal:		
Length of middle rays.....		16

Table of Measurements—Continued.

Current number of specimen	22,492 a.	
Locality	Schoodic Lakes, Me.	
	Millime- tres.	100ths of length.
Pectoral:		
Distance from snout		34
Length		18
Length of post-pectoral plate		14
Width of post-pectoral plate		4
Ventral:		
Distance from snout		45
Length		19
Branchiostegals	III	
Dorsal	II, I, 12	
Anal	I, 9	
Caudal	+ 12 +	
Pectoral	10	
Ventral	I, 1	
Number of plates in lateral line	15	

Additional Radial Formulæ.

Current number of specimen	22,492 b.	22,492 c.	22,492 d.	22,492 e.	22,492 f.
Locality	Schoodic Lakes, Maine.				
	Millime- tres.	Millime- tres.	Millime- tres.	Millime- tres.	Millime- tres.
Extreme length	36	33	31	30	30
Length to origin of middle caudal rays	31½	28	27	26	26
Dorsal	II, I, 12	II, I, 12	II, I, 11	II, I, 10	II, I, 11
Anal	I, 9		1, 8	I, 8	I, 8
Caudal	12	12			
Pectoral	10	10			
Ventral	I, 1	I, 1	I, 1	I, 1	I, 1

WASHINGTON, May 14, 1879.

REVIEW OF THE PLEURONECTIDÆ OF SAN FRANCISCO.

By W. N. LOCKINGTON.

The *Pleuronectidæ* of the Pacific Coast have been described by Girard (Proc. Acad. Nat. Sci. Phil. VII, 1854; VIII, 1856; and Pac. Rail. Rep. Vol. X, 145-156), by Ayres (Proc. Cal. Acad. Sci. 1855, Vol. I, 40, and Vol. II, 1859, 29-30), by Günther (Cat. Fish. Brit. Mus. Vol. IV, 1862, pp. 399-457), and by Gill (Proc. Ac. Nat. Sci. Phil. 1862, 280-281; 1864, 194-199; and 1865, 177). The greater number of the species was characterized by the first of these authors; but as the materials at hand were insufficient for thorough description, consisting usually of single or immature examples, the descriptions were necessarily incomplete. Dr. W. O. Ayres, among the many valuable additions to our ichthyological knowledge made by him during his residence on this coast, added two valid species to the list of our flounders. Dr. A. Günther enumerates the species described by Girard and Ayres, but collocates some of them

in different genera from those in which they were placed by their original describers, and, misled apparently by Girard's insufficient descriptions, characterizes two additional species from specimens which really belonged to forms described by that author. Finally, Prof. T. Gill reviews the labors of his predecessors, reclassifies the entire group, arranging them on a more definite system, and mentions in all seventeen species, including the *Pleuronectes quadrituberculatus* and *Pleuronectes cicatricosus* of Pallas, the *Pleuronectes glacialis* of Richardson (= *franklinii* Günther), and two supposed new species, both of which, however, are apparently synonymous with two of Girard's species; *Parophrys hubbardi* with *Parophrys vetulus* Gir., and *Metoponops cooperi* with the *Psettichthys sordidus* of the same author. It will thus be perceived that considerable confusion existed among our flat-fishes; and in the endeavor to identify the various species described by these authors among the examples in the Mus. Cal. Acad. Sci., and to pick them out among the fresh fishes, as they lay, exposed for sale, in the markets of San Francisco, I soon found that the descriptions of external characters already published needed revision and amplification, and that the task of identification was rendered difficult by the great variation in the number of the dorsal and anal fin-rays, in the width of the interocular space, and in the length of the pectorals, in fishes which evidently belonged to the same species.

A new and abundant species, with constant characters by which it could readily be distinguished from the one with which it had probably been hitherto confounded, was also discovered. It was at that time my intention only to take a few additional notes upon the known species, and publish them together with a description of the new form; but, at the suggestion of Prof. D. S. Jordan, of Indiana University, Bloomington, Ind., who is at this time preparing an ichthyology of the United States, which will include all the Pacific Coast species, I undertook the task of redescribing and more thoroughly characterizing all the known forms belonging to the family that occur in the markets of San Francisco.

By repeated visits to the markets, extending over a period of six months, I have verified the occurrence here of all the species hitherto described from this coast, with the exception of the more northern *Pleuronectes franklinii*, and the possible exception of the Pallasian species *quadrituberculatus* and *cicatricosus*. Two new species of rare occurrence, and belonging to a group not hitherto known to be found in our waters, have also been added to the fauna; but as five nominal species are eliminated, the total number of valid forms occurring here is only thirteen.

My method of procedure has been to write a full description from the specimens in the possession of the California Academy of Sciences, and then to incorporate with it the results of notes taken from fresh individuals, altering and adding so as to include the range of variation. The descriptions are not, therefore, from types, but from an examination of several specimens, and a comparison of these with several others. To the descriptions measurements of several specimens (except in the case of

one rare species) are appended; those taken from the preserved specimens and from the fresh individuals in my possession being supplemented by others taken from individuals as they lay on the stalls. The measurements are followed by remarks upon the variation of individuals, by the enumeration of two or three obvious distinguishing characters, and by such notes upon the localities, comparative abundance, &c., of the various forms as I have been able to collect. I greatly regret my inability to do much at present toward the elucidation of the habits, food, and distribution of the several species. The classification adopted is, with one or two exceptions, that which will be followed by Professors Jordan and Gilbert in their forthcoming work;* and I take this occasion to thank them for the valuable aid they have rendered me by sending me a copy of that portion of their manuscript, and on various occasions tendering me valuable information.

To conclude, I have taken every care to guard against error, but I am aware that it is possible that some of my conclusions may be open to criticism.

I have avoided burdening my descriptions with full synonymy and references, contenting myself with the already given enumeration of the works in which earlier descriptions will be found, and with the mention of the original name of each species.

SYNOPSIS OF THE GENERA AND SPECIES.

* Mouth large, the broad flat maxillary extending to below the eye; teeth nearly equal on both sides of the jaws.

a. Ventral fins both lateral, neither of them on the ridge of the abdomen.

(HIPPOGLOSSINÆ.)

b. Body dextral, eyes and color on the right side.

c. Lateral line with a semicircular arch in front; dentition strong; lower pharyngeal teeth in two rows.....HIPPOGLOSSUS.

1.*vulgaris*?

cc. Lateral line nearly straight; teeth rather small; scales moderate, ciliated.

x. No accessory lateral line; dorsal commencing over eye.

HIPPOGLOSSOIDES.

2. Eyes large; lower jaw scarcely projecting.....*jordani*.

xx. An accessory lateral line; dorsal commencing before the eye.

PSETTICHTHYS.

3. Anterior rays of dorsal produced; eyes small.....*melanostictus*.

bb. Body sometimes sinistral, sometimes dextral; dentition strong; lateral line with a semicircular arch in front.....PARALICHTHYS.

4. Accessory scales numerous; scales ciliate.....*maculosus*.

aa. Ventral fin of the colored side inserted on the ridge of the abdomen; body sinistral.....(RHOMBINÆ.)

Lateral line nearly straight; no vomerine teeth; dorsal rays all simple.....CITHARICHTHYS.

5. Scales almost membranous; interocular space concave.....*sordidus*.

** Mouth small, the short narrow maxillary rarely reaching before the front of the eye; teeth mostly on the blind side; body dextral.

(PLEURONECTINÆ.)

*A Synopsis of the Fishes of the United States. =Bulletin XVI of the United States National Museum.

- d. Lateral line simple, nearly straight.
- f. Dorsal fin very long, of more than ninety rays; body elongate; scales smooth.....GLYPTOCEPHALUS.
6. Teeth forming a sharp cutting edge, not developed at all on colored side; pectoral of colored side not produced.....*pacificus*.
7. Teeth forming a blunt edge, continued more than half-way along colored side; pectoral of colored side produced.....*zachirus*.
- ff. Dorsal fin moderate; scales developed as scattered stellate tubercles. PLATICTHYS.
8. Eyes and color sometimes on right, sometimes on left side. *stellatus*.
- dd. Lateral line with an accessory dorsal branch.
- e. Teeth slender, acute, in several series; lateral line nearly straight; body deep, short; lips thick.....PLEURONICTHYS.
9. Interocular space rather narrow, smooth, without ridges...*guttulatus*.
10. Lips plicate; dorsal continued downwards on blind side of head; interocular space very narrow, forming a raised tubercular ridge. *canosus*.
- cc. Teeth straight, blunt, in a close row, chiefly developed on blind side.
- g. Scales cycloid, those on cheeks similar; lateral line nearly straight. PAROPHRYS.
11. Snout narrow; upper eye diverted obliquely upwards.....*vetulus*.
- gg. Scales rough; lateral line arched; form oval.....LEPIDOPSETTA.
12. Scales on cheeks ctenoid.....*umbrosa*.
13. Scales on cheeks tuberculate.....*bilincata*.

All the species that I have examined have seven branchiostegals on each side, and the lateral line continued to the end of the caudal on both blind and colored sides. As I am not familiar with the Atlantic species, I cannot be certain whether these are to be considered as family characters; they are not mentioned in Günther's diagnosis of the *Pleuronectidae*.

HIPPOGLOSSUS Cuvier.

Mouth large, the large broad maxillary one-third, or not much more than one-third, of the length of the head. Teeth of upper jaw in a double series. Eyes and color on the right side. Gill-rakers short, compressed, widely set. Lower pharyngeal teeth in two rows; branchiostegals seven. Ventrals lateral; caudal emarginate, the outer rays produced. Scales very small, not ciliated. Lateral line with a semicircular arch in front.

HIPPOGLOSSUS VULGARIS Cuvier (?).

(*Hippoglossus vulgaris* ? Ayres.)

D. 102. A. 73. P. 16. V. 6.

The fin-formula given above is that of Ayres. The species is of rare occurrence on this part of the coast, but is occasionally brought to market. As I have as yet only seen one specimen, or rather a part of one, as the greater part of the body had been cut away and sold when I saw it, I cannot pronounce as to its specific identity with *H. vulgaris*. The only notes I could make were as follows: Teeth in a double row in both

jaws, with a few irregular teeth between the rows, about equally developed on both sides, strong, numerous. Branchiostegals seven. Interocular space wider than the length of the eye. Caudal with about 20 rays, the principal rays each several times bifurcate, the posterior margin nearly straight. Weight between 40 and 50 pounds. I am told that this fish will probably be of more common occurrence as the season advances. Toward the northern parts of our Pacific seaboard, at Vancouver's Island and along the shores of British Columbia, the halibut is said to be quite common, and to attain a weight of 70 to 100 pounds, or even more. Specimens from Alaska, I am told, have been identified by Dr. Bean with the Atlantic *H. vulgaris*.

HIPPOGLOSSOIDES Gottsche.

Mouth large; maxillary broad, flat, extending nearly to the centre of the eye; teeth nearly equal on both sides of the jaws, rather small, conical. No teeth on vomer or palatines. Eyes and color on the right side. Anterior nostrils on colored side with a short tube, on blind side with a raised margin; lower pharyngeal teeth in a single row. Dorsal commencing over the upper eye; ventrals both lateral; caudal entire, its middle rays produced. Scales of moderate size, more or less strongly ciliated; lateral line nearly straight, simple. Branchiostegals seven.

HIPPOGLOSSOIDES JORDANI sp. nov.

D. 90-94. A. 71-75. C. 2-15-2. P. 13. A. 6.

Dorsal and abdominal outlines equally and regularly curved from the line of the centre of the eyes to the caudal peduncle; upper outline of snout strongly curved, almost a quadrant, the junction of this curve with the dorsal outline forming a concavity over the anterior half of the upper eye. Peduncle of tail widening posteriorly, in its narrowest part from about $\frac{2}{9}$ to $\frac{2}{7}$ of the greatest depth of the body, which is a little over $\frac{1}{3}$ to $\frac{2}{3}$ of the total length; length of the head from $\frac{4}{15}$ to less than $\frac{1}{4}$ of the total length; eye contained about $4\frac{1}{2}$ times; snout (measured from a line joining the anterior margins of the orbits to the tip of the upper jaw) $5\frac{1}{2}$ to 6 times in the length of the head. Posterior nostrils of both sides situated on a line joining the front margins of the orbits; anterior nostrils on both sides with a raised margin, prolonged posteriorly into a linguiform flap; the posterior sub-elliptical, simple. Lower jaw not, or scarcely, projecting in the closed mouth; its lower straight border forming an obtuse angle with the abdominal outline, and its prominent posterior extremity below the centre of the eye; a knob at the symphysis. Cleft of mouth oblique, the tip of the premaxillaries on a horizontal line with the upper margin of the lower eye, and the posterior broad end of the maxillaries extending to nearly the centre of the lower border of the same. Dentition consisting of numerous sharp, slender, conical recurved teeth, in an irregular single row in the man-

dible, but forming a double row in the intermaxillaries. Front teeth largest in both jaws. The outer row in the intermaxillaries much larger than the inner, which is formed of very small teeth; but most of the outer row smaller than those of the mandible. The teeth on the colored side of the upper jaw are most numerous and smallest. Upper pharyngeals each with two irregular rows of teeth, the hinder largest, conical, sharp, recurved. Lower pharyngeals each with a single row of similar teeth. Eyes rather large, lateral, equal in front. Interorbital space rather narrow, equal in adults to about one-third of the longitudinal diameter of the eye. Gill-rakers long and slender, those of the first branchial arch about equal in length to the width of the interorbital space. Pectoral of the colored side scarcely $\frac{1}{2}$ of the total length, or slightly more than half the length of the head, inserted level with the lower eye, and consisting of 13 rays, the first two simple, the others once or twice bifurcate; the third ray longest, lower rays diminishing regularly. Pectoral of the blind side equal in width to that of colored side, but only about $\frac{2}{3}$ as long. Dorsal commencing on the dorsal ridge immediately over the anterior margin of the pupil, all the rays simple, except the two or three last, which (at least in most examples) are once bifurcate; the rays from the 37th to the 50th highest. Anal preceded by a horizontal spine, the first ray immediately behind a vertical from the posterior axil of the pectoral; all its rays simple, the three last excepted, coterminous with the dorsal, rays from 30th to 40th highest. Posterior margin of caudal entire, slightly convex, rays twice or thrice bifurcate. In large individuals, both the central and the outer rays are slightly produced, the central most. Ventrals small, inserted in advance of the pectorals, the distance between the posterior axil of the former and the anterior axil of the latter less than half the width of the pectoral base; their tips extending backwards beyond the anus nearly to the anal spine; the first two rays simple, the others once or twice bifurcate. Lateral line without abrupt arch, curving gently downwards from its origin to the median line of the side of the body, which it reaches at a vertical from the tip of the pectoral; thence straight to the end of the caudal. Number of scales in lateral line about 96 in a specimen 9 $\frac{3}{8}$ in. long. No accessory lateral line, but a row of pores across cheek and round the lower eye. Scales of colored side longer than wide, rather small, distinctly ciliate on their posterior margins, somewhat deciduous; uniform over the whole of the body opercles and cheeks, and continued forwards on the interorbital space to the anterior margin of the eye. Jaws and snout scaleless; scales of blind side not ciliated. A row of small ciliated scales along each ray of the dorsal and anal on the colored side, extending almost or quite to the tips of the rays; none on the first four dorsal rays; caudal with small scales on colored side; color almost uniform gray. Each scale has two transverse bands of black points, divided by a spotless light-colored band; the ciliated tip is also light, with a few black points. Fins nearly the same tint as the body, the

membrane between the rays of dorsal and anal becoming slightly darker towards the tips of the rays.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.
Total length, in inches.....	9 $\frac{3}{8}$	10 $\frac{1}{4}$	17 $\frac{1}{2}$	14 $\frac{5}{8}$
Length without caudal	8	8 $\frac{5}{8}$	.....	12 $\frac{1}{2}$
Greatest depth of body	3 $\frac{5}{16}$	3 $\frac{13}{16}$	6 $\frac{3}{4}$	5 $\frac{5}{8}$
Length of head	2 $\frac{1}{2}$	2 $\frac{5}{8}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$
Width from tip of dorsal to tip of anal .....	.....	.....	10 $\frac{1}{8}$	8 $\frac{3}{8}$
Longitudinal diameter of eye	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{7}{8}$	$\frac{3}{4}$
Length of snout, from a line joining the front margins of orbits	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{8}{8}$
Interocular space	$\frac{1}{2}$	.....	3 $\frac{9}{16}$	$\frac{1}{4}$
Length of pectoral, colored side (probably maimed)	1 $\frac{5}{16}$	1 $\frac{7}{16}$	2 $\frac{3}{8}$	1 $\frac{3}{8}$
Length of pectoral, blind side	$\frac{7}{8}$	1	1 $\frac{5}{8}$	1 $\frac{5}{8}$
Length of ventral	$\frac{1}{2}$	.....	1 $\frac{1}{2}$	1
Origin of anal to lateral line	2	.....	4 $\frac{3}{8}$	3 $\frac{11}{16}$
Greatest distance from anal to straight part of lateral	2 $\frac{3}{8}$	.....	4	3 $\frac{11}{16}$
Width of peduncle of tail, narrowest part	$\frac{3}{16}$	$\frac{1}{8}$	.....	.....
Height of centre rays of dorsal	$\frac{1}{16}$	.....	.....	.....
Length of lower jaw	1 $\frac{3}{16}$	.....	.....	1 $\frac{1}{16}$

Although this species is of quite common occurrence in the markets of San Francisco, it appears to have hitherto escaped description, probably on account of its external resemblance to Girard's *Psettichthys melanostictus*, from which it is not distinguished by the dealers, who are able to discriminate between most of the other species. With several other kinds, it is sold under the name of "Sole." From *melanostictus* it may be known by the more backward origin of the dorsal fin, the first rays of which are lower than those next following; by the larger eyes and rather narrower interocular space; the absence of an accessory dorsal branch to the lateral line, and the want of conspicuous black dots on the colored side. The surface is decidedly less rough than that of *melanostictus*, although the scales are ciliated. The number of scales in the lateral line is rather difficult to count, but there are about fourteen to an inch in an example 14 $\frac{5}{8}$ long (caudal included).

No. 1 had 90 dorsal and 71 anal rays; No. 2, D. 94, A. 72; and No. 4, D. 93, A. 75.

In the stomach of No. 2 were three half-digested anchovies (*Engraulis ringens*) and a shrimp-like crustacean (*Hippolyte*).

No. 2 had about 42 teeth in the mandible, and at least 62 in the intermaxillaries, those on the colored side most numerous and smallest; while in No. 4 the mandible had 14 teeth on the blind, and 11 on the colored side, the intermaxillaries about 14 on the blind, and numerous (ca. 50) small teeth on the colored side, without counting the inner row of still smaller teeth.

From *II. limandoides* = *dentatus*, of the Atlantic, the present species differs in having more dorsal and anal rays, and in the presence of an anal spine.

I have taken the liberty to name this species after my friend Prof. D. S. Jordan, in acknowledgment of the assistance and advice I have received from him.*

PSETTICHTHYS Girard.

Mouth large; maxillary broad, flat, extending to the front of the pupil; teeth well developed on both sides of the jaws, irregular. No teeth on vomer or palatines. Eyes and color on the right side; anterior nostril on colored side tubular, that on blind side with a flap. Lower pharyngeal teeth in a single row. Dorsal commencing in advance of the upper eye; ventrals lateral; caudal entire. An accessory lateral line on both sides of the body; lateral line nearly straight. Scales ciliated. Branchiostegals seven.

The only one of Girard's original characters which remains to distinguish this genus from *Hippoglossoides* is the more anterior commencement of the dorsal; as a thorough examination of specimens larger than those described by that author ($4\frac{3}{4}$ in. long) proves that ciliated scales are common to both genera. The presence of an accessory lateral line is, however, a character which appears sufficient to warrant the separation of this form as a genus or sub-genus, since it is used as a generic character in the *Pleuronectinae*.

PSETTICHTHYS MELANOSTICTUS Girard.

D. 78-88. A. 58-62. C. 3-6-6-3. P. 11. V. 6.

Body elongated, narrow; dorsal and abdominal outlines regularly curved and nearly equal from nape and ventrals to caudal peduncle; curve of snout joining that of nape over the anterior half of the upper eye; abdominal outline from posterior end of mandible to ventrals nearly straight. Greatest depth contained in the total length from about three to a little more than two and a half times; head four to five times in the same. Eyes small, contained seven to eight times; snout (measured from orbit of upper eye to tip of intermaxillaries) about five times in the length of the head; peduncle of tail from three and a half to four times in the greatest depth. Anterior nostril on colored side with a short tube, the opening wide and anterior; that on blind side with a raised margin or short tube, prolonged posteriorly; posterior nostril on both sides without flap, its posterior border in advance of the anterior border of the orbit. Eyes equal in front, lateral; interocular space smooth, not elevated, of variable width. Mouth large, oblique; lower jaw considerably the longer, its tip, in the closed mouth, level with the lower margin of the upper eye; a prominent symphysial knob; mandible joining the abdominal outline at an obtuse angle. Posterior extremity of the maxillary extending to a vertical drawn from the front of the pupil. Teeth rather small, in a single row on both sides of both jaws, conical, sharp, recurved, those in front much the largest in both jaws, and those in the mandible larger than those in the intermaxillaries (ex-

cept three or four large canines in front of the latter). Teeth on colored side of upper jaw very small, numerous. In adults about 33 teeth in the mandible, 43-50 in the intermaxillaries. A single row of six or seven sharp, conical, recurved teeth on each upper pharyngeal; lower pharyngeals very slender, each armed with a row of about twelve slender, sharp, recurved teeth. Gill-rakers of first branchial arch about half the length of the eyes, flexible, those of the other arches similar, but shorter. Origin of dorsal a little in advance of the anterior margin of the upper eye, and immediately above the posterior nostril of the blind side; its anterior rays over the eyes and on the occiput higher than those immediately behind them, but not quite equal to the longest rays of the central portion of the fin, which are from about the thirtieth to the fortieth rays. The first ray is twisted to the left, toward the nostril. From the central rays the fin declines regularly to its termination opposite to that of the anal, and distant from the caudal about half the depth of its peduncle. Anal with an acute horizontal spine, its origin opposite the centre of the length of the pectoral, and its longest rays opposite to those of the dorsal. Peduncle of caudal very slightly dilated at the base of that fin, the posterior margin of which is convex, and the principal rays once or twice bifurcate, the first bifurcation at about one-third of their length from the base. Pectoral of colored side with eleven rays, the rays, except the first two, once bifurcate; that of the blind side nearly equal in size and similarly bifurcate. Ventrals inserted with their posterior axil about half the width of the pectoral base in advance of the anterior axil of that fin; their rays once or twice bifurcate, and their extremity falling short of the vent. Lateral line very slightly raised above the pectorals, about 107-118 scales between its origin and that of the caudal in a specimen eleven inches long. An accessory lateral line along the base of the dorsal, ending about under the 24th dorsal ray on the colored side, and under the 17th-20th on the blind side. A branch from this accessory line to the main lateral line at back of head; a line of pores, indistinct in small specimens, more distinct in larger, can be traced from the lateral line across the cheek to the lower margin of the upper eye; and a little behind the end of this a row of pores branches downwards around the lower eye, ending opposite the posterior margin of the pupil. Scales very small, imbricate, ciliate, extending over head and gill-covers; snout and lower jaw scaleless. Free end of each scale truncate. A single row of small scales along each ray of the dorsal and anal on the colored side, except on about the first third of the dorsal and the first two or three rays of the anal. Caudal covered with small ciliated scales on the colored side almost to the tip of the rays, and with smooth scales on the blind side. Scales of blind side smooth, a few scales on the bases of the central rays of the dorsal and anal on this side. Color of right side ash-gray, interspersed with crowded black dots just large enough to be perceptible with the naked eye; numerous black points on the exposed part of each scale. When

fresh the ground-tint is lighter, and the black points much less distinct than after exposure to the air. Left side uniform white.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.
Total length, in inches.....	6 $\frac{1}{2}$	10 $\frac{1}{2}$	11	14 $\frac{1}{2}$	15	15 $\frac{1}{2}$	17	17 $\frac{3}{8}$
Greatest depth of body.....	2 $\frac{1}{2}$	4	3 $\frac{1}{2}$	5 $\frac{1}{2}$	4 $\frac{7}{8}$	5 $\frac{1}{2}$	6	6 $\frac{3}{8}$
Distance from tip of lower jaw to origin of anal, in a straight line.....		3 $\frac{3}{8}$	3 $\frac{3}{8}$					
Length of head.....	1 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{3}{8}$	3 $\frac{3}{16}$	3 $\frac{1}{2}$	3 $\frac{1}{2}$	3 $\frac{7}{8}$	3 $\frac{13}{16}$
Width of interocular space.....		$\frac{1}{5}$	$\frac{7}{16}$	$\frac{3}{8}$		$\frac{1}{5}$		$\frac{3}{8}$
Longitudinal diameter of lower eye.....		$\frac{3}{8}$		$\frac{3}{8}$		$\frac{1}{2}$		$\frac{1}{2}$
Length of snout, from orbit of upper eye.....				$\frac{5}{8}$		$\frac{1}{16}$		$\frac{7}{8}$
Length of pectoral, colored side.....		1 $\frac{7}{8}$	1 $\frac{1}{16}$	1 $\frac{3}{16}$		1 $\frac{1}{2}$		
Length of pectoral, blind side.....			1	1 $\frac{5}{16}$		1 $\frac{1}{4}$		
Length of ventrals.....			$\frac{3}{4}$					
Height of longest dorsal rays.....		1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{4}$		1 $\frac{3}{8}$		1 $\frac{11}{16}$
Height of longest anal rays.....			1 $\frac{3}{16}$			1 $\frac{3}{8}$		1 $\frac{11}{16}$
Height of first dorsal ray.....				1 $\frac{3}{16}$		1		1 $\frac{5}{16}$
Length of lower jaw.....				1 $\frac{1}{2}$		1 $\frac{11}{16}$		1 $\frac{7}{8}$
Width of peduncle of tail.....		$\frac{7}{8}$	1 $\frac{1}{16}$			1 $\frac{1}{16}$		1 $\frac{1}{8}$
Greatest distance from anal to straight part of lateral line.....			1 $\frac{1}{16}$	2 $\frac{7}{8}$		3 $\frac{3}{8}$	3 $\frac{1}{2}$	
Number of rays in dorsal.....	82	88	82			81		84
Number of rays in anal.....	62	60	60			58		60

As will be seen by the foregoing figures, the width of the interocular space, the length of the pectorals, that of the caudal peduncle, and the number of rays in the dorsal, are very variable.

In the stomach of an example 7 $\frac{1}{4}$ inches in length were the half-digested remains of two anchovies (*Engraulis ringens*) each about three inches long.

This is the most common of the species sold as "Sole" in the markets of this city. Most of the individuals brought to market are from ten to twelve inches in length; but many reach sixteen or even eighteen inches. The black dots over the upper side, the long anterior dorsal rays, inserted more in advance than is usual, and the small eyes, render this fish easy to recognize.

PARALICHTHYS Girard.

Mouth large, the broad, flat maxillary reaching to the posterior margin of the lower eye; teeth in a single row on both sides of both jaws; eyes and color usually sinistral. Lower pharyngeals covered with villiform teeth; villiform teeth on the first pair of upper pharyngeals; also a row of larger teeth. Remainder of upper pharyngeal teeth like the larger of the first pair. Gill-rakers long. Anterior nostrils on both sides with a flap. Dorsal commencing above eye; anal without a spine; caudal sinuous on its posterior border; ventrals both lateral. Lateral line with a semicircular arch in front; no accessory lateral line. Scales ciliate; numerous accessory scales on their posterior margins.

PARALICHTHYS MACULOSUS Girard.

Cropssetta californica Gill, 1864.*Hippoglossus californicus* Ayres.

D. 69-76. A. 53-60. C. 3-12-3. P. 10-12. V. 6.

Body elongated, dorsal outline forming a low regular curve from the junction of the snout to the caudal peduncle; snout rather long, a slight depression over the anterior part of the upper eye, where it joins the dorsal outline. Abdominal outline from the extremity of the mandible to the caudal peduncle forming a curve corresponding to that of the dorsal outline. Greatest depth a little less than $\frac{3}{8}$; length of head about $\frac{1}{3}$ of the entire length; eye about $\frac{1}{8}$ - $\frac{1}{7}$, snout $\frac{3}{14}$ of the length of the head; interocular space $\frac{1}{10}$ - $\frac{1}{7}$ of the same; width of caudal peduncle about $\frac{1}{4}$ of the greatest depth; greatest distance from anal to straight portion of lateral line less than the length of the head. Anterior nostrils of both sides with a tongue-like flap on their posterior border; posterior nostrils patulous, small, slightly in advance of the orbit. Eyes equal in front, small, the upper well below the dorsal ridge, yet somewhat directed upwards. Interocular space smooth, flat, not elevated, a scarcely perceptible ridge from origin of lateral line to upper eye, where it divides, forming a raised margin to the posterior portion of that eye; a short ridge over the anterior part of the upper margin of the lower eye; in large individuals the width of the interocular space exceeds the length of the eye. Mouth large; maxillary reaching to a vertical from the posterior margin of the lower eye, and to a distance below that eye exceeding its longitudinal diameter. Mandible about $\frac{9}{16}$ of the length of the head, its tip level with the upper margin of the lower eye; its straight lower border forming a very obtuse angle with the abdominal outline; a slight symphyseal prominence. Teeth in both jaws slender, acute, slightly recurved, about 15 in the upper and 8 in the lower jaw in individuals under 12" long, besides numerous rasp-like teeth in the hinder part of the intermaxillary. The front teeth in the mandible are longer and more recurved than those farther back. First pair of upper pharyngeals a cushion of villiform teeth, with a row of about 12 larger recurved ones; second and third hamypharyngeals united, with three or four irregular rows of teeth like the larger of the first pair; lower pharyngeals covered with villiform teeth. Gill-rakers of first pair of branchial arches slender, flexible, nearly as long as the eye. Dorsal commencing over the front margin of the upper eye; the first ray slightly twisted to the left; the length of the rays increasing but slightly to its greatest height in the centre of its length, and thence diminishing very slowly, forming a low arch; the distance between its termination and the origin of the caudal about equal to the depth of the caudal peduncle; dorsal and anal coterminous. A few of the posterior rays of the dorsal and anal are bifurcate. Anal without spine, its origin very slightly behind the vertical from the anterior axil of the pectorals, and forming a low arch similar to that fin, the longest rays equal in length to those of the dor-

sal. Caudal with an undulating posterior margin, the central rays and outer rays somewhat produced; all the principal rays three or more times bifurcate. The longest dorsal rays are about the 30th-38th; the longest anal rays about the 15th-23d. Pectoral of the colored side about half the length of the head, and contained in the total length between nine and ten times; its rays once or twice bifurcate, the first two excepted; the third ray longest, the twelfth about half its length; pectoral of the blind side considerably shorter than that of colored side; its rays simple or some of them once bifurcate. Ventrals inserted more than the width of the base of the pectoral in front of that fin, their tips reaching nearly to the fourth anal ray; their length about half, or a little more than half, that of the pectoral of the colored side; the four posterior rays once bifurcate. Scales of body small, very finely ciliate on their free margin, covering the whole of the body and the head to the middle of the length of the interorbital space, and extending up the dorsal and anal rays nearly to their tips. Some on the broad end of the maxillary. Along the free margin of each of the principal scales is ranged a variable number of much elongated, narrow, accessory scales, easily rubbed off. Numerous similar supernumerary scales on the dorsal and anal rays. Scales of blind side smaller than those of colored side, smooth, with accessory scales as on colored side. Caudal covered with scales on both blind and colored sides; some in front of the central rays of dorsal and anal on blind side. Lateral line, in small individuals, containing about 100 scales between its origin and that of the caudal, and raised above the pectoral into a bold arch of a diameter exceeding the length of the pectoral, and a height about equal to the length of the ventral. Color dark reddish brown to slaty gray above, whitish below; usually five small light bluish spots along the dorsal region, and four along the abdominal. In large individuals, the spots are obsolescent or wanting.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length, in inches	10	9 $\frac{3}{8}$	12 $\frac{1}{2}$	11 $\frac{1}{2}$	21 $\frac{7}{8}$
Length without caudal	8 $\frac{5}{8}$	8 $\frac{1}{8}$	10 $\frac{3}{8}$	9 $\frac{1}{2}$	18 $\frac{3}{8}$
Greatest depth of body	3 $\frac{5}{8}$	3 $\frac{5}{16}$	4 $\frac{5}{16}$	4	7 $\frac{1}{2}$
Length of head	2 $\frac{7}{16}$	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	4 $\frac{7}{8}$
Greatest distance of anal to straight part of lateral line	1 $\frac{7}{8}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	.....
Tip of lower jaw to origin of anal	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	5 $\frac{1}{2}$
Longitudinal diameter of eye	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{9}{16}$
Interocular width	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$
Length of snout from upper eye	$\frac{3}{2}$	$\frac{7}{8}$	$\frac{9}{8}$	$\frac{1}{8}$	1
Length of lower jaw	1 $\frac{7}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{8}$	2 $\frac{1}{2}$
Length of pectoral of colored side	1	1	1 $\frac{1}{2}$	1 $\frac{1}{8}$	2 $\frac{1}{2}$
Length of pectoral of blind side	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{7}{8}$	1 $\frac{7}{8}$
Length of ventrals	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1 $\frac{7}{8}$
Length of arch of lateral line	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{8}$	1 $\frac{1}{8}$	3
Rise of arch of lateral line	$\frac{3}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$	1
Width of caudal peduncle	1 $\frac{5}{8}$	$\frac{7}{8}$	1 $\frac{1}{2}$	1	.....
Longest dorsal ray .....	.....	.....	.....	.....	1 $\frac{1}{2}$
Longest anal ray .....	.....	.....	.....	.....	1 $\frac{1}{2}$

This is not of very frequent occurrence in our markets, although it can scarcely be called rare. It attains a larger size than any other of our species except the true *Hippoglossus*, and it is probably this circumstance, together with its elongated form, that has led the fishermen to name it the "Bastard Halibut." Large specimens are sold under this name, but immature individuals are retailed as "Turbot." The largest I have yet seen weighed, respectively, 43 and 58 pounds, and the latter measured about 4 feet 10 inches in length when entire. It is very seldom taken in the bay, and is said to be of more frequent occurrence southwards than northwards, but I cannot at present ascertain its southern range. From its occurrence at Monterey it is often called the Monterey halibut. It is said to be a tough, coarse fish. It is taken as far north as Tomales Bay. Nos. 1, 2, 3, and 4 (of which the dimensions are given) are young alcoholic specimens in the Museum of the Cal. Acad. Sci., and their dorsal and anal fin-rays were, respectively, D. 76, A. 60; D. 70, A. 55; D. 70, A. 55; and D. 71, A. 53. No. 5 had 69 dorsal and 53 anal rays. Some specimens have a few pores on the occiput behind and above the horizon of the upper eye, running downwards and backwards towards the lateral line. The number of scales in the lateral line is very difficult to count. From all the other Californian species with large jaws, it may be known by its elongate form and boldly arched lateral line.

I have for some time suspected that *Uropsetta californica* (Ayres) Gill, and *Paralichthys maculosus* Girard, were identical, and I think that I can now demonstrate their identity beyond reasonable doubt. My suspicion arose as follows: The large specimens of the Monterey halibut, weighing 40-50 pounds, are considered by all the dealers to be of the same species as the small specimens, and, from their general similarity, no doubt as to their identity with each other and with *Uropsetta californica* arose in my mind until, on critically comparing a small individual with Girard's description of *P. maculosus*, I found that it agreed with the latter in every particular except in its sinistral eyes and color. Now arose two questions: 1st. Were the large individuals really specifically identical with the small ones? 2d. Was there a dextral form, and, if so, was the dextral form a distinct species?

I have not yet had the opportunity to take full measurements of a full-grown individual, as all the large ones I have seen were cut up before I examined them, but I have the following reasons to give for including all under one species:

1st. The form of the caudal fin and the outline of the posterior part of the body are alike in large and small sinistral individuals; the former having the sinuous posterior margin, with the central and external rays produced, described by Girard as characteristic of *P. maculosus*.

2d. The smaller sinistral individuals agree with Ayres's description of *Hippoglossus* (*Uropsetta*) *californicus*, except in the form of the tail, which is shown as slightly concave in Ayres's figure (Proc. Cal. Acad.

ii, 1860, fig. 10). The figure is but a sketch, and is inaccurate in many respects.

3d. The larger individuals are always sold as "halibut," attain the dimensions of the true halibut, and are evidently identical with Ayres's species.

4th. The small sinistral individuals have all the characters of *Paralichthys maculosus* Gir., except the position of the eyes and color, and some difference in the color of the spots.

These reasons, although they point strongly towards identity, do not prove it; but I have lately procured an individual (No. 5) which has the characteristics of Ayres's species, yet is *dextral*, thus agreeing exactly with that of Girard; so that I can now add to my reasons—

5th. A specimen of dimensions intermediate between that of Girard (7' long) and the large individuals before mentioned has the characters of *U. californica*, but is *dextral*, as stated by Girard in his description of *P. maculosus*. In this specimen, the interorbital area is proportionally much wider than in the smaller examples, exceeding the longitudinal diameter of the eye; and the row of spots along the dorsal and abdominal outlines, so evident in the small individuals, is almost obsolete, traces of one or two of the posterior ones being all that is left of them. The principal caudal rays are many times dichotomized, the base of the fin is fleshy, and its scaly covering is very conspicuous; some of the rays of the right pectoral are twice bifurcate; about eight of the posterior rays of the dorsal and anal are bifurcate; each ray of the dorsal and anal (except the most anterior and posterior) is seen to have, upon its anterior face, a row of principal scales, and numerous accessory scales, all resembling those of the body, but smaller; each scale of the body is seen to be followed by several supernumerary scales arranged around its posterior margin; and the pectoral of the colored side has only ten rays; that of the blind side eleven. As this is the only *dextral* example out of about ten individuals that have come under my observation, I am inclined to believe that *dextral* specimens are comparatively rare, at least on this part of the coast. As the generic name *Paralichthys* has precedence over that of *Uropsetta*, it must be retained for the species, which must henceforth be known as *Paralichthys maculosus*.

CITHARICHTHYS Bleeker.

Mouth large, the broad, flat maxillary more than one-third the length of the head, and extending to below the pupil. Eyes and color on the left side. Teeth in both jaws in a single series, unequal in size, nearly equally developed on both sides of the jaws; no vomerine or palatine teeth. Lower pharyngeal bones with a single row of teeth. Gill-rakers lanceolate. Branchiostegals seven. Dorsal fin commencing on the snout; dorsal and anal rays simple; ventral fin of colored side inserted on the ridge of the abdomen. Lateral line nearly straight. Scales moderate.

Metoponops Gill is evidently identical with *Citharichthys*. All the characters usually considered generic agree; and the specific characters given (Proc. Acad. Nat. Sci. Phil. 1864, 198) are those which properly belong to *Citharichthys sordidus* Girard. Girard's description, taken from an immature individual $5\frac{1}{2}$ in. long, is in many respects defective; that of Gill approaches much nearer to completeness, but, as it was taken from a single sun-dried specimen, it shows characters which arise from the drying.

CITHARICHTHYS SORDIDUS (Girard) Günther.

Psettiichthys sordidus Girard.

D. 92-99. A. 72-81. C. 3-11-3. P. 13. V. 6.

Outline of body sub-ellipsoid, but the dorsal and abdominal outlines not correspondent, the highest point of the former situated over the tip of the pectoral, while the lowest point of the latter is below the base of the same fin. Snout almost continuous with the dorsal outline, which rises rapidly to the highest point in a bold curve, and thence falls with a gently sigmoid curvature to the caudal peduncle. Abdominal outline almost straight to the ventrals, thence with a slight sigmoid curve around the lowest point to the caudal peduncle. Thus the hinder part of the body tapers gradually in a line which becomes slightly concave, both above and below, as it approaches the caudal peduncle. Greatest depth of body contained $2\frac{3}{8}$ times; length of the head $4\frac{1}{3}$ times in the greatest length; longitudinal diameter of eye about $\frac{1}{4}$, snout (measured from the lower eye) about $\frac{1}{5}$ of the length of the side of the head. Distance from origin of anal to lateral line slightly in excess of the length of the head; peduncle of tail short, about $\frac{1}{5}$ of the greatest width, slightly widening toward caudal. Eyes elliptical, large, the upper turned somewhat upward, the lower lateral, and about $\frac{1}{5}$ of its longitudinal diameter in advance of the upper; interocular space equal to about half the transverse diameter of the eye, and made to appear narrower by an elevated ridge, which, commencing on the cheeks, passes along the posterior lower margin of the upper eye, descends obliquely to the upper margin of the lower orbit, and continues to the intermaxillary. A less prominent ridge along the lower margin of the upper eye, merging in the principal ridge where it commences to descend. Thus the anterior and larger portion of the interocular area is concave. Nostrils of colored side in a line with the upper margin of the lower eye; anterior nostrils of both sides with a long narrow flap in front; posterior simple. The anterior nostril of the colored side has also a raised margin, prolonged somewhat posteriorly. Mouth large, oblique; extremity of the mandible slightly projecting, and on a level with the upper margin of the pupil of the lower eye when the mouth is closed. The lower border of the mandible almost in a straight line with the anterior part of the abdominal outline. Posterior extremity of the maxillary extending to a vertical drawn midway between the

centre and the front of the pupil of the lower eye. Teeth slender, acute, incurved, closely set at regular distances from each other, gradually increasing in size forwards; about equal in size on both sides of both jaws, and extending the full length of the gape on both sides. Upper pharyngeals each with a single row of 6-8 slender, rather long, sharp, recurved teeth; lower pharyngeals each with a single functional row of similar teeth, all but some of the most anterior buried in the gum almost to their points; lower pharyngeal bones separate. Gill-rakers of 1st pair of branchial arches about equal in length to the width of the interocular space, rather stiff; those of the other arches gradually diminishing to the fourth; spinulose on their upper edge. Dorsal arising a little before the anterior rim of the upper orbit, close behind the posterior nostril of the blind side; gradually increasing in height to about the 38th-48th rays, which are behind the highest point of the dorsal outline, and thence rapidly decreasing; the last rays small and closely set. Anal arising vertical with the posterior axil of the base of the pectorals; its longest rays (23d-27th) somewhat deeper than those of the dorsal are high. From these rays the depth of the fin diminishes rapidly to its termination opposite that of the dorsal; the posterior rays, like those of that fin, very small and closely set. No anal spine visible externally. Posterior margin of caudal almost straight when closed, but slightly wedge-shaped; the centre rays longest, when opened out; principal rays bifurcate three times. Pectoral of left or colored side about $\frac{1}{6}$ of the total length, and consisting of thirteen rays, all, except the first three, once bifurcate; fourth ray longest. Pectoral of right side $\frac{3}{5}$ - $\frac{2}{3}$ of the length of that of the colored side; rays simple. Ventrals short, but broad at base and broadly rounded when opened, their tips extending beyond the third anal ray, and the posterior margin of their base situated a little anterior to the anterior axil of the pectoral. Ventral of the colored side on the abdominal ridge; rays simple. Lateral line almost straight, yet rising somewhat anteriorly; very distinct; tubes simple. Number of scales between base of caudal and head 65-70. No lines of pores on head. Scales rather large, very thin and flexible, deciduous, almost membranous, smooth; the free end truncate, each pocket of the dermis bordered by a delicate membrane of darker color than the scale, and often broken up into tags; engaged portion of scale with slight radiating striæ. Those of the anterior portion are as deep as long, or even deeper; those of the posterior part of the body and of the caudal peduncle are more or less elongated. The scales vary much in size and shape; the largest are on the abdominal region behind and below the pectoral; the smallest around the eyes and on the interorbital space, snout, and lower jaw; the two latter only partially covered with scales. Dorsal and anal with a row of small scales along each ray on the colored side. Caudal scaly at the base, and with the membrane between the rays covered with scales on both sides. Scales of blind side similar to those of colored. Color dull reddish yellow; the outline of each scale rendered distinct by the margin of darker membrane behind each scale;

vertical fins of a uniform dark slaty tint. Color of blind side uniform creamy.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length, in inches	9 $\frac{3}{4}$	12	11	10 $\frac{1}{4}$	9 $\frac{1}{2}$
Length without caudal				8 $\frac{1}{2}$	8 $\frac{1}{2}$
Greatest distance from origin of anal to lateral line.....	2 $\frac{5}{8}$	3	2 $\frac{3}{8}$	2 $\frac{3}{8}$	2 $\frac{3}{8}$
Greatest depth of body.....	3 $\frac{5}{8}$	4 $\frac{5}{8}$	4	3 $\frac{1}{2}$	3 $\frac{7}{8}$
Length of head	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{5}{8}$	2 $\frac{3}{8}$	2 $\frac{5}{8}$
Length of pectoral, colored side	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$	1 $\frac{1}{2}$	1 $\frac{3}{4}$
Length of pectoral, blind side.....		1 $\frac{3}{8}$	1 $\frac{5}{8}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$
Length of ventrals	1 $\frac{5}{8}$	2	2	1 $\frac{1}{2}$	1 $\frac{3}{4}$
Longitudinal diameter of eye	1 $\frac{5}{8}$	1	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$
Length of snout, from lower eye			1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$
Width of interocular space, about.....	3 $\frac{1}{2}$	4	4	1 $\frac{5}{8}$	1 $\frac{5}{8}$
Longest dorsal ray			1 $\frac{1}{2}$		
Length of lower jaw			1 $\frac{5}{8}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$
Width of peduncle of tail, narrowest part.....			2 $\frac{3}{8}$		2 $\frac{3}{8}$
Number of dorsal rays			92	92	99
Number of anal rays			76	75	81

Three other specimens, the fin-rays of which were counted, had respectively D. 95, A. 72; D. 93, A. 76, and D. 98.

Girard gives the number of dorsal rays as 82, while none of the specimens which I have examined have less than 92. As the range in number of dorsal and anal fin-rays is considerable in the individuals I have examined, it is quite possible that some may have as few as 82 dorsal rays; but the close agreement in the number of anal rays found by Girard and by myself leads me to suppose that the number 82 is a typographical error.

This is a tolerably common species in our markets, but is usually taken outside of the bay. I have not yet seen any exceeding 12-14 inches in length.

From No. 5 was taken a specimen of *Engraulis ringens*, which it had only partially swallowed when caught; the tail hanging out of the mouth.

The *Engraulis* thus appears to be a favorite article of food with at least three of our large-mouthed flat-fishes. This species may be readily recognized by its sinistral coloration and eyes, its smooth scales, dirty yellow color, and the gradual tapering of the body into the caudal peduncle, with a concave curve on both dorsal and abdominal outlines. Unlike *Platichthys stellatus* and *Paralichthys maculosus*, this species appears to be invariably sinistral.

GLYPTOCEPHALUS Gottsche.

Form extremely elongated; mouth small, the short, narrow maxillary scarcely reaching the front margin of the eye; teeth most developed on the blind side, incisor-like, broad, equal, forming a continuous cutting edge. No vomerine or palatine teeth. Upper pharyngeal bones each with an obliquely transverse row of about nine bluntly conical teeth; lower pharyngeals with a single row of similar teeth. Branchiostegals seven. Eyes and color on the right side. Anterior nostrils with a short

tube, prolonged posteriorly. No accessory lateral line; lateral line very nearly straight. Dorsal fin very long, of more than ninety rays; scales smooth. Anal with or without a spine; caudal convex on posterior margin.

The following two species are separated by well-marked characters from each other; but I have not considered it necessary to use a different generic name for *G. zachirus*, in which the anal is preceded by a spine, and the teeth are continued farther on the blind side.

GLYPTOCEPHALUS PACIFICUS sp. nov.

D. 99-104. A. 80-87. P. 10-12. V. 6. C. 3-8-8-3.

Form elongate ellipsoid, dorsal and abdominal outlines curving regularly and similarly from head to caudal peduncle, which slightly increases in width posteriorly. Snout continuous with dorsal outline, but slightly more curved; lower margin of head straight. Greatest width contained about $3\frac{3}{4}$, head more than 5 times in the total length, or the former about $3\frac{1}{4}$ and the latter about $4\frac{1}{2}$ times in the length without the caudal. Eyes about $\frac{1}{4}-\frac{2}{7}$; snout (measured from the lower eye) $\frac{1}{5}-\frac{1}{7}$ of the length of the head. Anterior nostril on both sides tubular, the tube short, its posterior margin produced into a flap; posterior without flap. Nostrils small; hinder margin of posterior nostril about vertical with the anterior margin of the upper orbit. Lower eye somewhat in advance of the upper, which reaches the dorsal profile at its anterior extremity. Interorbital space a very narrow, smooth, somewhat elevated ridge of bone. Cleft of mouth nearly equal on both sides, very small, oblique; the maxillary reaching but little beyond a vertical from the anterior margin of the lower eye, and scarce so far as a vertical from that of the upper. Tip of mandible level with the centre of the lower eye, and scarcely projecting in the closed mouth. Lips tolerably well developed. Teeth broad, thin, incisor-like, forming a continuous sharp cutting edge along the blind side of both jaws, but in both ending rather abruptly before reaching the colored side. Twelve teeth in the lower and nine or ten in the upper jaw; those at the anterior commencement of the row slightly smaller than the others. Upper pharyngeal bones with 5-9 sharp conical teeth on each, the anterior with the greatest number; lower pharyngeal teeth in two rows, sharp, conical, those of the inner row larger than those of the outer, except in front, where there are a few larger teeth; equal in size in both rows. Gill-rakers short, slender, flexible, lanceolate. Dorsal and anal long and low, similar, coterminous, fleshy at base; the rays simple, their tips free. Dorsal commencing opposite the centre of the pupil of the upper eye, the longest rays a little behind the centre of the length of the fin, and about $\frac{1}{4}$ of the width of the body in length. No spine before anal, the first ray of which is only a little posterior to the hinder pectoral axil, and its longest rays opposite and equal to those of the dorsal. Distance from the end of the dorsal and anal fins to the caudal equal to about half the depth of the caudal peduncle. Caudal with two or four accessory rays on each side, not very wide; posterior

margin slightly convex when opened, the principal rays twice bifurcate. Pectorals small; that of colored side contained about $8\frac{1}{2}$ times in the total length; rays twelve in number, once bifurcate. Pectoral of blind side scarcely three-fourths as long as that of the colored side; rays nine or ten, some of them bifurcate. Ventrals very small, inserted about the width of the pectoral base in advance of the anterior axil of that fin; their length contained more than five times in that of the head. Lateral line straight, passing along the median line of the side of the body and of the caudal, about 140 scales from its origin to the base of that fin. Scales very small, smooth, becoming smaller along the dorsal and abdominal margins; smaller scales continuing for some distance upwards and downwards on the bases of both the dorsal and anal, upon both blind and colored sides, especially upon the latter, where scales cover the whole surface between as well as upon the rays. The bases of the pectorals and caudal are also covered with scales on both sides. On the fore part of the anal, the scales reach to the tips of the rays. The scales upon the fins are much smaller than those upon the body. Scales on blind side smooth; snout scaleless. Color nearly uniform dark blackish gray; the scales covered on their exposed portion with black points, which cannot be distinguished by the naked eye. Blind side opaque white, with numerous small black dots evenly distributed. Fins on colored side with the membrane light slate-color, sprinkled with small black dots; the rays and scales of the same color as the body. Distal margins of all the fins considerably darker. The black dots extend to the interior of the mouth, covering the hyoid surfaces, and the pharyngeal teeth are tipped with reddish orange.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length to tip of caudal, in inches	$8\frac{9}{16}$	$8\frac{3}{4}$	$10\frac{3}{16}$	$8\frac{7}{16}$	$8\frac{1}{2}$
Length without caudal, about	$7\frac{3}{8}$	$7\frac{7}{16}$	$8\frac{7}{8}$	$7\frac{1}{8}$	$6\frac{7}{8}$
Greatest depth, about	$2\frac{1}{2}$	$2\frac{3}{16}$	$3\frac{1}{8}$	$2\frac{3}{8}$	$2\frac{3}{8}$
Length of head	$1\frac{1}{2}$	$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{3}{8}$	$1\frac{3}{8}$
Length of pectoral, blind side	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{9}{16}$	$\frac{9}{16}$
Length of pectoral, colored side	1	$3\frac{1}{2}$	$1\frac{3}{8}$	$\frac{1}{2}$	1
Length of ventrals		$\frac{5}{16}$	(*)	$\frac{8}{16}$	$3\frac{1}{2}$
Diameter (longitudinal) of eye		$\frac{1}{16}$	$\frac{1}{16}$	$\frac{7}{16}$	$\frac{7}{16}$
Width of interorbital space		$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{16}$
Length of snout, horizontal, from lower eye		$\frac{1}{4}$	$\frac{3}{16}$		
Distance from tip of mandible to origin of anal	2	$1\frac{1}{8}$		$1\frac{1}{8}$	$1\frac{3}{4}$
Width from tip of highest rays of dorsal to tips of ditto of anal	$3\frac{5}{16}$	$3\frac{7}{16}$	4		
Width of caudal peduncle in narrowest part			$\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$
Length of snout from lower eye		$\frac{1}{4}$	$\frac{3}{16}$		
Distance from tip of mandible to origin of anal	2	$1\frac{1}{8}$		$1\frac{1}{8}$	$1\frac{3}{4}$
Length without caudal, about	$7\frac{3}{8}$	$7\frac{7}{16}$	$8\frac{7}{8}$	$7\frac{1}{8}$	$6\frac{7}{8}$
Width from tip of dorsal to tip of anal rays	$3\frac{5}{16}$	$3\frac{7}{16}$	4		
Width of caudal peduncle			$\frac{1}{2}$	$3\frac{1}{2}$	$5\frac{1}{2}$
Length of lower jaw			$\frac{1}{16}$	$\frac{1}{4}$	$\frac{1}{2}$
Origin of anal to lateral line			$1\frac{1}{8}$	$1\frac{5}{16}$	$1\frac{1}{4}$
Number of dorsal rays	104	102	99		101
Number of anal rays	87	84	80		86

* Damaged.

† Scarcely.

The scales upon the body and fins are highly deciduous, and the lateral line is much less distinctly pronounced than in the succeeding species. Although the lowest pair of branchiostegals is not easy to make out, I have no doubt that seven is the correct number. The individual $10\frac{3}{16}$ in length, No. 3, is the largest I have yet seen, and is probably adult. In flavor this fish is inferior to *G. zachirus*. This species was certainly not brought to market during the winter months. I first saw it March 15, and from that date to the end of April a few have usually been exposed for sale, but it cannot be said to be abundant. It is not taken within the bay.

The dark color, elongated form, and correspondingly long dorsal and anal fins render this species easy to distinguish from every other except *G. zachirus*, from which it can be known by its short pectoral, entire want of teeth on colored side, and more pointed form of the front part of the head, as well as by the absence of an anal spine. *G. pacificus* differs from *G. cynoglossus* of the Atlantic in the greater relative length of the head, the smaller number of teeth in the upper jaw, and the smaller number of dorsal and anal rays.

GLYPTOCEPHALUS ZACHIRUS sp. nov.

D. 94-106. A. 79-89. C. 5-6-7-4. P. 11-13. V. 6.

Body elongate-ovate, the anterior portion of the oval shorter than the posterior; snout declivous, almost vertical, its tip level with the upper margin of the lower eye, and its curve uniting without sensible depression with that of the nape; dorsal outline rising with a regular gentle curve from the snout to about the twenty-second dorsal ray, thence declining very gradually and regularly with but slight curvature to the caudal peduncle. The abdominal outline is almost straight from the knob of the mandible to the ventral; from thence to the end of the anal curved in the same manner as the dorsal outline. Peduncle of tail slightly expanded towards the caudal, its least width about one-fourth of the greatest depth of the body. The greatest width of the body is contained from $3\frac{1}{3}$ to $3\frac{1}{2}$ times, and the length of the head from about $5\frac{1}{3}$ to $5\frac{1}{4}$ times in the total length; the eye about $3\frac{1}{3}$ times, and the snout about 8 times in the length of the head. The greatest distance from the anal to the lateral line is less than the length of the head. Eyes large, elliptical, lateral, the lower in advance of the upper about half the length of the pupil, and scarcely reaching the dorsal profile anteriorly. Interocular space very narrow, about $\frac{1}{8}$ of the longitudinal diameter of the eye, smooth, not raised above the eye in a fresh fish. A slight ridge rises at its posterior part, forms the lower posterior margin of the upper eye, and dies out on the cheek. Nostrils of right side level with the upper margin of the lower eye; the anterior with a short tube, the posterior with a raised margin, and vertical with the front margin of the lower orbit. Posterior nostril of blind side in advance of the eye; anterior nostril nearly as on colored side.

The nostrils are small and inconspicuous. Gape of mouth very small on colored side, considerably larger on the blind side. On the colored side the cleft is nearer vertical than horizontal; the posterior end of the maxillary reaches very little behind the anterior margin of the orbit of the lower eye, and the symphysis of the intermaxillaries is about level with the upper edge of the orbit. Mandible projecting in the closed mouth, short, not passing a vertical from the front margin of the pupil, with a prominent knob below the symphysis, and a smaller one at its posterior extremity. Teeth on both sides of the jaws throughout the full length of the gape, in a single row, broad, but thick, forming a blunt continuous edge, about thirty-four in the lower jaw and rather fewer in the upper in an individual $11\frac{3}{16}$ ' long. In an example $14\frac{5}{8}$ ' long there were 14 teeth on the colored and 26 on the blind side of the mandible, the latter the larger; in the intermaxillaries, 13 on the colored and 23 on the blind side. Each lower pharyngeal with a double row of teeth, the inner larger than the outer; the four anterior teeth of the outer row conspicuously larger than those following. About 12 teeth in each inner row. Upper pharyngeals each with a close-set row of 6-7 blunt conical teeth. Branchiostegals seven; gill-rakers few, flexible, very short. Dorsal commencing between the front of the orbit and the pupil, considerably behind the nostrils, long and low, forming a continuous arch of slightly greater curvature than the dorsal outline, the longest rays in the central portion, and ending opposite to the anal at about two-thirds of the width of the caudal peduncle from the origin of the caudal. Anal with a horizontal spine, the first ray rather distant from the visible portion of the spine, and nearly the length of the ventral behind the pectoral base; similar to the dorsal. Almost all the rays of dorsal and anal directed backwards. Caudal convex on posterior margin, rather narrow, the rays once bifurcate, sometimes bifurcate again near the tips. Pectoral of colored side exceedingly long and lanceolate, about one-fourth of the total length of the fish; the first five rays simple, the others once bifurcate. Fourth ray longest, fifth nearly equal, sixth a little longer than the third, thence diminishing rapidly. Usual proportion of the first four rays 3-8-10-12. Pectoral of blind side lanceolate, rather more than one-third of the length of that of the colored side, and formed of the same number of rays, the first four simple, the others once forked; fourth and fifth rays longest. Ventrals inserted so that their hinder axil is vertical with, or a little posterior to, the anterior axil of the pectoral; their tips reaching to the first anal ray; the four posterior rays once bifurcate. Lateral line almost straight, rising very slightly anteriorly, formed of a double row of tubes, about 138 in number, excluding those upon the caudal. A row of similar pores commencing at the ridge under the upper eye, and continuing around the lower eye almost to its front margin. Scales small, smooth, uniform over the body, and extending over the head to the snout, on which they are smaller. Intermaxillaries and mandibles scaleless. Scales of blind side similar. Caudal scaly on both sides;

no scales on the other fins. Color uniform brownish or cinereous; fins darker. The color formed by minute dark spots on the scales. Membrane between fin-rays closely set with dark points. Blind side whitish, the ground tint clouded with numerous black points.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.
Greatest length, in inches	11 $\frac{3}{16}$	12 $\frac{3}{8}$	12 $\frac{3}{8}$	14 $\frac{3}{8}$
Length without caudal	9 $\frac{5}{8}$	10 $\frac{1}{8}$	10 $\frac{1}{8}$	12 $\frac{1}{2}$
Greatest depth of body	3 $\frac{1}{2}$	3 $\frac{5}{8}$	3 $\frac{5}{8}$	4 $\frac{1}{2}$
Greatest depth over dorsal and anal fins .....	.....	5 $\frac{1}{2}$	.....	.....
Length of head	2 $\frac{1}{16}$	2 $\frac{5}{16}$	2 $\frac{1}{2}$	2 $\frac{5}{8}$
Longitudinal diameter of lower orbit .....	.....	1 $\frac{1}{8}$	1 $\frac{1}{8}$	.....
Width of interocular space .....	.....	.....	.....	.....
Length of snout, from lower eye .....	.....	.....	.....	.....
Length of pectoral, colored side	3 $\frac{1}{2}$	2 $\frac{15}{16}$	3 $\frac{1}{2}$	3 $\frac{1}{8}$
Length of pectoral, blind side	1	1	1 $\frac{1}{16}$	1 $\frac{1}{8}$
Length of ventrals	3 $\frac{1}{2}$	.....	1 $\frac{1}{8}$	1 $\frac{1}{8}$
Width of caudal peduncle .....	.....	.....	.....	1
Distance from tip of lower jaw to first ray of anal	2 $\frac{3}{4}$	.....	3 $\frac{1}{16}$	.....
Greatest distance from anal to lateral line	11 $\frac{3}{8}$	.....	2 $\frac{1}{2}$	2 $\frac{3}{8}$
Length of lower jaw .....	.....	1 $\frac{1}{8}$	.....	.....
Length of longest dorsal ray .....	.....	1 $\frac{3}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{8}$
Length of snout, from upper eye .....	.....	.....	.....	.....
Number of dorsal rays	97	94	106	98
Number of anal rays	80	79	89	81

Two other specimens had respectively D. 94, A. 80, and D. 94, A. 82. The length of the pectoral, as might be expected in so long and narrow a fin, varies somewhat; and the proportional length of the first five rays is not constant. No. 4 was measured while perfectly fresh; the others after a few days' immersion in alcohol. In the fresh fish, the interocular space is not raised above the eyes, and the upper boundary of the orbit is hard to define; but, in alcoholic specimens, the interocular space stands out as a narrow ridge of bone. Like the preceding species, *G. zachirus* is of rare occurrence in the markets, and is not taken in the Bay of San Francisco.

During the six months previous to March none were taken; but the dealers assure me that it usually makes its appearance, in limited quantities, in the spring months. Most of the dealers, however, do not distinguish between this fish and the preceding one, and sell both as "Sole."

One dealer, who evidently knew the fish, describing it by its long pectoral, assured me that its flavor was superior to that of any other of our species; I mention this because I had myself previously come to the same conclusion. Its flesh is very firm and white, and its flavor approaches that of the true sole. No. 4 is the largest I have seen, and from the answers I obtain to enquiries, I believe it is beyond the average size. The long pectoral, bluff snout, and presence of teeth on the colored side of the mouth at once distinguish this species from the preceding, as well as from every other species. The nostrils in this and the pre-

ceeding species are similar, the anterior having a short tube or funnel, produced posteriorly into a flap; but the flap is shorter in this species than in the other.

PLATICHTHYS Girard.

Form broad; mouth small; maxillary short, not reaching to the pupil of the lower eye; teeth blunt, in a single row, most developed on the blind side of both jaws. Eyes sometimes on the right, sometimes on the left side. Anterior nostril of colored side tubular; that of blind side with a posterior flap. Dorsal not in advance of the eye; anal with a horizontal spine; caudal with the central rays most produced posteriorly. Lateral line slightly arched anteriorly; no accessory dorsal branch. Scales developed as scattered stellate tubercles, forming a regular series along the dorsal and abdominal outlines, and on each side of the lateral line. Branchiostegals seven; gill-rakers short; pharyngeal teeth tubercular.

PLATICHTHYS STELLATUS (Pallas) Girard.

(*Platichthys rugosus* Girard.)

D. 54-61. A. 42-44. C. 3-6-6-3. P. 11-12. V. 6.

Form broad and short; outline, including dorsal and anal, broadly rhombic; dorsal and abdominal outlines of the body boldly and regularly curved; snout less declivous than the dorsal outline, which it joins over the centre of the eye; caudal peduncle long, the sides straight for some distance behind the end of the dorsal and anal fins. Greatest height of the body contained $2\frac{1}{6}$ - $2\frac{1}{2}$ times, head rather more than 4 times in the greatest length; eye about 6 times, snout (measured horizontally from the lower eye) about 6 times in the length of the head; caudal peduncle about 5 times in the greatest depth of the body. Nostrils of colored side in a depression in a line with the centre of the interocular space, the anterior tubular; anterior nostril of blind side with a posterior flap and a raised margin, posterior without flap. Eyes equal in front, or nearly so, the lower sometimes very slightly in advance, the upper eye looking obliquely upwards. Interocular space less than half the longitudinal diameter of the eye; a low prominence running upwards and backwards from the anterior upper margin of the lower eye to the posterior lower border of the upper eye, and thence backwards to the origin of the lateral line; above the operculum this rises into a prominent tubercle. Mouth small; mandible projecting somewhat in the closed mouth, its tip level with the upper margin of the lower eye, and its lower margin forming a very slight angle with that of the head; posterior end of the maxillary reaching a vertical slightly in advance of the lower eye. Teeth short, broad, forming an irregular cutting edge, in a single row in both jaws, most developed on the blind side, but extending more than half-way along the colored side. Upper pharyngeal bones each with an irregular series of tubercular teeth, sometimes more or

less broken into smaller rows; lower pharyngeal bones broad, covered with tubercular teeth. Gill-rakers short, broadly conical at base, about as long as the interocular is wide, flexible, widely separated. Dorsal commencing above the middle of the eye, highest in the centre, about the 31st-32d ray, thence diminishing regularly and in nearly a straight line to its termination at a distance from the caudal equal to the depth of the caudal peduncle. The longest rays are about $\frac{3}{8}$ of the length of the head, and placed a little behind the broadest part of the body. Anal with a more or less conspicuous spine, similar in shape to the dorsal, and coterminous with it. Sixteenth ray longest, the rays behind this diminishing in nearly a straight line to the end of the fin; the longest anal rays shorter than those of the dorsal. Caudal rather large, its rays once bifurcate; posterior margin with the central rays more or less produced. Pectoral of colored side contained about twice in the length of the head; the rays from the third to the ninth once bifurcate. Pectoral of blind side rather shorter than that of colored; its first five rays simple. Ventrals of six simple rays, a vertical from the posterior margin of their base touching the anterior axil of the pectoral base, their tips reaching the anal spine, but falling short of the first ray of that fin. Scales of body formed of scattered, stellate, tuberculate bodies, irregularly disposed on both blind and colored sides, but smaller upon the former, and closer together on the cheeks and interocular space than on the body. A few on the snout; front part of snout and greater part of lower jaw scaleless. A regular row of rather larger scales accompanies the lateral line on both sides, above and below. Scales on caudal peduncle elongate, subimbricate, rough on their posterior edges only. A bare space on the operculum, and another on the cheek, of the blind side. A regular row of large, stellate, irregularly shaped, rough scales between the bases of the dorsal and anal fin-rays, one between each pair of rays; these scales larger than those of the rest of the body. No scales on dorsal or anal; caudal rough, with very small scales on the base and outer rays of the colored side, and to a less extent on those of the blind side. Lateral line with a slight curve above the pectoral; the rise much less than the width of the base of that fin; the anterior extremity nearly horizontal. A row of pores from a little above the lower margin of the upper eye around the lower to front of pupil. No scales on lateral line; pores tubular; about 83 between base of caudal and head in an individual $9\frac{3}{4}$ in length. Color olivaceous, with areas of citrine when fresh; the blind side white. Dorsal and anal fins with four, caudal with three, black bands running in the direction of the rays, the lighter portions of these fins reddish brown or olivaceous. Individuals colored on both sides, except on a small portion of the blind side, and others having nearly the whole of the eyed side white are occasionally brought to market.

Localities.—Kamtschatka, Behring's Straits, Vancouver Island, Fraser River, (*vide* Günther); Humboldt Bay, San Francisco.

In 1862, Prof. Gill and Dr. A. Günther identified this species with the *Pleuronectes stellatus* of Pallas.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length, in inches.....	8 $\frac{1}{16}$	9 $\frac{3}{8}$	14 $\frac{5}{8}$	22 $\frac{3}{8}$	13 $\frac{15}{16}$
Length without caudal.....	6 $\frac{1}{2}$	.....	11 $\frac{5}{8}$	.....	11 $\frac{1}{2}$
Greatest height of body.....	3 $\frac{1}{16}$	3 $\frac{1}{8}$	6 $\frac{1}{4}$	10 $\frac{3}{8}$	6 $\frac{5}{16}$
Height from tip of dorsal to tip of anal.....	.....	.....	.....	.....	9
Distance from tip of lower jaw to origin of anal.....	2 $\frac{1}{16}$	3 $\frac{3}{8}$	.....	.....	4 $\frac{7}{16}$
Length of head.....	1 $\frac{5}{16}$	2 $\frac{1}{2}$	3 $\frac{1}{2}$	5 $\frac{1}{2}$	3 $\frac{3}{8}$
Longitudinal diameter of eye.....	$\frac{1}{8}$	$\frac{3}{8}$	.....	.....	$\frac{1}{8}$
Width of interocular space.....	$\frac{3}{32}$	$\frac{5}{32}$	$\frac{5}{16}$	.....	$\frac{7}{32}$
Length of snout, from lower eye.....	$\frac{9}{32}$	$\frac{5}{8}$	$\frac{9}{16}$	.....	$\frac{1}{16}$
Length of longest ray of dorsal.....	$\frac{7}{8}$	1 $\frac{5}{16}$	.....	3 $\frac{1}{4}$	1 $\frac{5}{8}$
Length of longest ray of anal.....	$\frac{7}{8}$	1 $\frac{1}{2}$	.....	3 $\frac{1}{4}$	1 $\frac{5}{8}$
Length of pectoral of colored side.....	$\frac{1}{8}$	1 $\frac{3}{16}$	1 $\frac{1}{8}$	.....	1 $\frac{5}{8}$
Length of pectoral of blind side.....	$\frac{3}{4}$	1 $\frac{1}{8}$	1 $\frac{7}{8}$	.....	1 $\frac{5}{8}$
Length of ventral.....	$\frac{3}{16}$	$\frac{8}{16}$	.....	.....	1 $\frac{5}{8}$
Width of caudal peduncle where narrowest.....	$\frac{2}{32}$	$\frac{25}{32}$	.....	2	1 $\frac{5}{32}$
Distance from end of dorsal to caudal fin.....	$\frac{3}{4}$	$\frac{7}{8}$	.....	2	1 $\frac{1}{4}$
Greatest distance from anal to straight portion of lateral line.....	1 $\frac{5}{16}$	2 $\frac{1}{16}$	3 $\frac{1}{4}$	.....	3 $\frac{3}{8}$
Length of caudal.....	.....	.....	.....	4	2 $\frac{7}{16}$

The formulæ of the fin-rays of dorsal and anal in these specimens were as follows: No. 1, D. 61, A. 42; No. 2, D. 60, A. 43; No. 3, D. 59, A. 42; No. 4, D. 58, A. 43; No. 5, D. 59, A. 44. Nos. 1 and 2 are alcoholic specimens, and have both eyes and color upon the right side.

This is the most abundant of all the flat-fishes brought to our markets, and attains a larger size than any other except the Bastard Halibut (*Paralichthys maculosus*) and the Hippoglossus. Those taken in San Francisco Bay attain a weight of eight, ten, or even twelve pounds, while still larger individuals are brought from Humboldt Bay. Those brought from the latter locality are, however, very coarse and comparatively poor in flesh, so that they do not fetch by far so high a price as those taken near San Francisco. It is sold under the name of "Flounder," which here appears to be limited strictly to this species. Its broad rhombic form, elevated dorsal, deep anal, long caudal peduncle, stellate scales, and the bands of color which adorn the vertical fins, give this fish an unmistakable *facies*. The eyes and color are sometimes upon the right and sometimes upon the left side. Out of sixty-five individuals, which I counted as they lay upon the stall, thirty-two were colored upon the right and thirty-three upon the left side. On another occasion I counted seventy-five sinistral and fifty-eight dextral individuals, and on a third thirty-eight dextral and forty-eight sinistral. Is it not possible that the difference of color may be a sexual one? This is the idea of the more intelligent dealers, but it has not been verified by dissection. Individuals occasionally occur with both sides olivaceous, some white blotches alone marking the usually uncolored side; on the other hand, I have seen one example which had both sides white, except along the dorsal and abdominal outlines and head of the eyed side.

PLEURONICHTHYS Girard.

Form broad; eyes and color on the right side. Mouth small; maxillary narrow, short; teeth in several series, slender, acute, most developed on the blind side. No teeth on vomer or palate. Lips more or less thick. Lower pharyngeals with a double row of teeth. Gill-rakers short, flexible. Anterior nostrils on both sides with a flap; posterior patulous. Dorsal of less than eighty rays. Anal preceded by a spine; dorsal and anal rays simple. Branchiostegals seven; no free preopercular margin.

PLEURONICHTHYS GUTTULATUS Girard.

Hypsopsetta guttulata Gill.

Parophrys ayresii Günther.

D. 66-72. A. 47-54. P. 11-13. C. 3-12-3. V. 6.

Form broadly oval; the dorsal outline regularly curved from the snout to the peduncle of the tail. Curve of snout meeting that of dorsal outline over the centre of the eye, forming a slight concavity. Abdominal outline running downwards and backwards in a straight line to the origin of the anal, thence to the caudal peduncle curved like the dorsal. Form, including dorsal and anal fins, broadly rhombic. Height of body nearly to quite half of the total length from the tip of the snout to that of the caudal; length of head nearly to rather more than $\frac{1}{5}$ of the same; caudal peduncle $\frac{1}{9}$ - $\frac{1}{8}$ of greatest depth. Snout short, about $\frac{2}{3}$ of the diameter of the orbit. Nostrils on a line with the upper margin of the lower eye; anterior nostril on both eyed and blind side with a flap behind; posterior patulous. Eyes about $\frac{1}{5}$ of the length of the head, the lower slightly in advance of the upper, which is slightly directed upwards. Interocular space narrow, smooth, elevated, about $\frac{1}{3}$ of the longitudinal diameter of the eye. Mouth small, very oblique, lower jaw scarcely projecting, the tip of the mandible about level with the top of the pupil of the lower eye; maxillary reaching a little beyond the front margin of the lower orbit. Lips rather thick. A broad band of villiform teeth in front in both jaws; continued also along the blind side in the intermaxillary and the mandible, but along the colored side in the mandible only. Pharyngeal teeth cardiform, in two or three irregular rows on each upper pharyngeal bone, and in a double row on each of the lower. Gill-rakers very short, blunt, flexible, distant. No free margin to preoperculum, the skin covering and uniting that bone to the other opercular bones. Dorsal commencing a little in front of the centre of the eye, highest about the 37th ray, which is about half the length of the head. Dorsal and anal forming an obtuse rounded angle, giving the fish a rhombic form. Anal usually with a spine, its longest rays opposite and equal in length to those of dorsal; its origin very slightly behind a vertical from the posterior axil of the pectoral. Anal and dorsal coter-

minal at about $\frac{1}{3}$ of the depth of the caudal peduncle from the caudal fin. Caudal slightly and regularly convex on its posterior margin, its rays thrice bifurcate. Pectoral of colored side narrow; the rays, except the first two, bifurcate; its length equal to the distance of the lower eye from the tip of the operculum, or about $\frac{2}{7}$ of the total length; the fifth ray longest. Pectoral of blind side about $\frac{3}{4}$ of the length of that of colored side, its rays once bifurcate, the first four excepted. Ventrals about half the length of the pectoral of the colored side; their posterior axil vertical with the anterior angle of the pectorals, and their four posterior rays bifurcate. Lateral line very gently curved above the pectoral, and contained 83 pores in specimens 10 inches long. Accessory lateral line variable in length, ending from the 30th to the 59th dorsal ray in different individuals, usually about equally developed on the blind side. Scales rather small, cycloid, subcircular; those of the anterior portion of the body not imbricated, but entirely surrounded by skin; those of the posterior part imbricated. Scales of the abdominal region smaller than those on the rest of the body; those upon the head narrow, much elongate, separate. Scales of the blind side similar in character to those on the colored side; those on the head like those on colored side of head. Snout, interocular space, and lower jaw scaleless. Dorsal and anal with three rows of small, narrow, elongate scales along each ray of their central portion, a few upon the blind side of those fins. Caudal covered with scales similar to those of the other vertical fins, but covering both rays and membrane on both sides of the body. Color of the eyed side dark olive-green, deepening almost to black on exposure to the air, and often blotched with whitish. Each of the body-scales tipped with black. Blind side opaque-white; a margin of yellow around the head from origin of dorsal to anus.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Total length, in inches.....	9 $\frac{5}{8}$	12 $\frac{1}{4}$	10 $\frac{1}{16}$	7 $\frac{7}{8}$	13 $\frac{1}{2}$	11 $\frac{7}{8}$	10
Total length without caudal.....	8 $\frac{1}{4}$						8 $\frac{1}{2}$
Greatest depth of body.....	4 $\frac{1}{16}$	5 $\frac{1}{16}$	5 $\frac{1}{16}$	3 $\frac{1}{4}$	6 $\frac{1}{2}$	5 $\frac{7}{8}$	4 $\frac{3}{8}$
Length of head.....	2 $\frac{1}{16}$	2 $\frac{3}{8}$	2 $\frac{1}{8}$	1 $\frac{7}{8}$	2 $\frac{3}{4}$	2 $\frac{3}{8}$	2 $\frac{1}{2}$
Longitudinal diameter of eye.....		$\frac{1}{8}$	$\frac{7}{16}$		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{16}$
Width of interocular space.....		$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{8}$	$\frac{3}{16}$
Length of snout.....		$\frac{5}{16}$	$\frac{9}{16}$	$\frac{1}{8}$	$\frac{3}{8}$		$\frac{1}{2}$
Length of pectoral, colored side.....	1 $\frac{3}{8}$	1 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{5}{16}$	1 $\frac{1}{2}$	1 $\frac{3}{8}$	1 $\frac{1}{16}$
Length of pectoral, blind side.....	1	1 $\frac{1}{16}$	1 $\frac{5}{16}$		1 $\frac{1}{8}$	1 $\frac{1}{8}$	$\frac{7}{8}$
Length of ventrals.....	$\frac{9}{16}$	$\frac{6}{8}$	$\frac{6}{8}$				$\frac{9}{16}$
Length of longest ray of dorsal.....	1 $\frac{1}{8}$	1 $\frac{5}{16}$				1 $\frac{3}{8}$	1
Distance in a straight line from tip of lower jaw to origin of anal.....	2 $\frac{7}{8}$		2 $\frac{7}{8}$	2 $\frac{1}{2}$			2 $\frac{7}{8}$
Distance from tip to tip of longest rays of dorsal and anal.....	6 $\frac{7}{8}$	8 $\frac{1}{16}$					
Length of lower jaw.....	$\frac{1}{16}$	$\frac{1}{2}$	$\frac{1}{16}$				$\frac{3}{16}$
Width of peduncle of tail, narrowest part.....	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{3}{16}$		1 $\frac{1}{2}$		1 $\frac{1}{2}$
Greatest distance from anal to straight part of lateral line.....		3 $\frac{1}{2}$				3 $\frac{1}{2}$	2 $\frac{1}{16}$

The interocular space in this species is narrow, perfectly smooth, and without ridge or concavity. No. 7 is an anomalous individual, colored similarly on both sides, except upon the cheeks and opercular apparatus of the blind side, which were yellow when fresh, but have faded to white in alcohol. In this fish, the upper eye is less lateral than usual, and, as if to give it more scope of upward vision, the dorsal outline and fin do not curve downwards to meet the curve of the snout, but end in a point about $\frac{1}{4}$ " above the eye; the outline from the back of the eye to the point taking the form of a hollow or "scotia."

Girard first described this form in Proc. Ac. Nat. Sci. Phil. 1856, p. 137, and afterwards in the U. S. Pac. R. R. Rep. x, 152. His specimens came from Tomales Bay, an inland harbor similar to that of San Francisco, but smaller, and situated within the range of the fishing-vessels which supply the markets of San Francisco. Dr. Günther, writing in 1862, places *guttulatus* in the genus *Pleuronectes*, and quotes Girard's description, at the same time describing, under the name of *Parophrys ayresii*, a form that is evidently the one common in this market. In a note he states that "it appears to us specifically distinct from *P. canosa*," but makes no comparison between it and *P. guttulatus*.

A careful comparison of Girard's description of *guttulatus* with Günther's of *ayresii* reveals no differences except in the proportions, which are variable in most of our flat-fishes, and in the color, which is described by the latter as "uniform brownish lead-colored," by the former as "greyish or lead, sprinkled all over with black dots and whitish spots." In the only form which I have seen, the whitish spots are of frequent occurrence. The greatest discrepancy between the two descriptions is in the size of the eyes, which Girard states are "contained three times in the length of the side of the head," but which Günther gives as one-fifth of the length of the head. All the specimens I have seen agree in this respect, as also in other proportions, more closely with Günther's *ayresii*.

Gill (P. A. N. S. Phil. 1864, p. 196) queries the distinctness of *P. ayresii*, and his query tends to confirm the impression of the identity of the two species that I had formed before perusing his paper.

Most of the smaller specimens that I have examined have the number of rays of the dorsal and anal fins as given by Günther for *P. ayresii* (D. 66, A. 47), which differs from that given by Girard for *guttulatus* only in the absence of one dorsal ray; but larger examples have a much larger number of rays: No. 2 (12 $\frac{1}{4}$ " long) had 72 dorsal, 54 anal, and 13 pectoral rays; another specimen, 12 $\frac{3}{4}$ " long, had D. 70, A. 48; and No. 5 had D. 71, A. 49. This species is very abundant, and is occasionally taken inside, but usually outside, the bay; it is called by the dealers "Turbot," and attains occasionally a length of 18", and a weight of about 5 pounds. It can be readily recognized by its broad form, convex caudal, the dark dull color of the eyed side, and the yellow margin round the head on the blind side. I am informed that the greater portion of the turbot brought here are taken in the vicinity of Tomales Bay.

PLEURONICHTHYS CŒNOSUS Girard.

D. 72-76. A. 46-54. C. 3-14-3. P. 10-13. V. 6.

Body broad, comparatively thick; nape almost continuous with snout, and much less curved than the part of the dorsal outline immediately behind it. At the seventeenth dorsal ray the dorsal outline commences to rise rapidly, forming a bold and regular sweep from thence to the end of the dorsal. Abdominal outline nearly a straight line to the ventrals, thence curved like the dorsal. Greatest depth of body $\frac{4}{5}$, length of head about $\frac{2}{5}$ of the total length; longitudinal diameter of orbit nearly $\frac{1}{3}$ of the length of the head; width from tip to tip of expanded dorsal and anal fins nearly $\frac{2}{3}$ of the total length. Caudal peduncle usually about $\frac{1}{5}$ as wide as the greatest depth of the body, widening considerably toward the caudal base. Snout extremely short and bluff, its length less than $\frac{1}{4}$ of the diameter of the orbit, and its profile cut off from that of the nape by the projection of the upper orbital margin. Nostrils of right side in a depression on the horizon of the upper margin of the lower eye, those of the blind side on the dorsal ridge slightly behind the front margin of the orbit; both anterior nostrils with a flap; posterior patulous. Eyes elliptical, very large, even in front, the upper directed obliquely upwards, the upper bony ridge of its orbit raised above the dorsal ridge. Interocular space a very narrow bony ridge, its extremities raised into prominences, and scarcely $\frac{1}{16}$ " wide in a specimen $9\frac{1}{8}$ " long. This ridge continues forward round the anterior margin of the upper eye to its raised upper margin; on the posterior margin of the upper eye there are also two almost spinous prominences. Mouth small, extremely oblique, nearer vertical than horizontal; the end of the maxillary, in consequence of this obliquity, scarcely reaching the front margin of the orbit; mandible not projecting in the closed mouth. Lips thick, fleshy, and plicate. Teeth very small, acute, in a broad band in the mandible on the blind side and for about two-thirds of the length of the colored side. On the intermaxillaries a much narrower band on the blind side, scarcely reaching to the symphysis; none on the colored side of these bones. Teeth of the blind side of the mandible very slender, much recurved. Each upper pharyngeal with a row of about eight conical, sharp, recurved teeth; lower pharyngeals with a double row of very small teeth. All the teeth buried deeply in the gum, only their points visible. The lower pharyngeal bones are very small and slender. A prominent short ridge between the origin of the lateral line and the tubercles of the hinder margin of the upper eye; from the anterior end of this a long low prominence runs downwards across the opercular bones, slightly inclining forwards, and ending level with the row of pores under the eye. Margin of the preoperculum united by the skin to the other opercular bones. Gill-rakers very short, flexible, wide apart. Dorsal fin twisted over to the left side at a point over the centre of the eye (about ten rays from its origin) and continued downwards in a curved line to a little below the posterior extremity of the maxillary on that side, the first rays

higher than those immediately following. The rays again increase to about the forty-fifth, where the fin forms almost an angle, the rays rapidly diminishing to its termination opposite that of the anal, at about half the depth of the peduncle from the caudal. Anal commencing a little behind the base of the pectoral, similar to the dorsal, its longest rays about the 23d-25th, where the fin forms a rounded angle similar to that of the dorsal, the rays diminishing thence regularly and rapidly. Longest rays of dorsal and anal about $\frac{2}{3}$ of the length of the head. Anal usually with a small spine; all the rays of dorsal and anal simple; those behind the longest rays inclined forwards. Caudal rather broad, its rays twice bifurcate; the first bifurcation at about the middle, the second at three-fourths of their length from the base; posterior margin regularly convex. Pectoral rather short; that of colored side contained $7\frac{1}{2}$ - $8\frac{1}{2}$ times in the total length, about $1\frac{2}{3}$ times in that of head; that of blind side much shorter, about $\frac{9}{12}$ of the length of the head. Rays of pectoral of colored side once bifurcate, the two uppermost excepted; those of the blind side undivided. Ventrals $\frac{4}{9}$ of the length of the head, their rays undivided, and the tips of the fins extending beyond the origin of the anal; their base very broad, its posterior portion below the anterior portion of the pectoral base. Lateral line median on the caudal peduncle, and thence forwards to nearly the tip of the pectorals, where it commences to rise slightly, with very small curvature, to its origin. Accessory lateral line ending below the 45th-53d ray of the dorsal; that of the blind side rather shorter. A line of pores commences at the tubercles on the posterior margin of the upper eye, is continued behind the lower eye at some distance from it, and thence along the suborbitals to a line with the front of the pupil—about sixteen tubular pores. Scales rather small, smooth, not imbricated, except on the caudal peduncle, but imbedded in the skin; those on cheeks and opercles smaller, and those of the left side considerably smaller than those of the right. Snout, interocular space, and lower jaw scaleless. Several rows of extremely small scales on dorsal and anal rays; caudal rays with very small scales on both sides. Color of a fresh individual dark chocolate-brown, becoming reddish on the lower part of the head; after exposure to alcohol the color becomes duller, and the scales show distinctly lighter than the surrounding skin. Others are olivaceous. All are much lighter when covered with mucus. Blind side creamy white, in some spotless, in others with three or four large, and several smaller, dark-brown blotches on the anterior portion of the body. Dorsal and anal fins clouded with dark and light olivaceous; pectoral of colored side dark.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length, in inches	12 $\frac{3}{8}$	11 $\frac{5}{16}$	10 $\frac{5}{8}$	9 $\frac{1}{8}$	6 $\frac{1}{8}$
Length without caudal	10 $\frac{1}{4}$	9 $\frac{3}{16}$	.....	.....	4 $\frac{1}{2}$
Length of head	2 $\frac{3}{8}$	2 $\frac{1}{4}$	2 $\frac{3}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$
Greatest depth of body	5 $\frac{3}{8}$	5 $\frac{1}{8}$	4 $\frac{5}{8}$	4 $\frac{1}{8}$	2 $\frac{1}{16}$
Depth from tip of dorsal to that of anal	8 $\frac{1}{8}$	.....	.....	.....	.....
Length of lower jaw .....	.....	$\frac{3}{4}$	.....	.....	1 $\frac{7}{8}$
Distance from tip of lower jaw to origin of anal .....	.....	2 $\frac{5}{8}$	.....	.....	1 $\frac{1}{16}$
Width of caudal peduncle	1 $\frac{1}{8}$	1 $\frac{1}{32}$	.....	.....	$\frac{1}{2}$
Longitudinal diameter of lower eye-ball	1 $\frac{1}{8}$	1 $\frac{1}{8}$	.....	.....	.....
Length of pectoral, colored side	1 $\frac{1}{8}$	.....	1 $\frac{1}{4}$	1 $\frac{1}{16}$	.....
Length of pectoral, blind side	1 $\frac{1}{8}$	.....	1	1 $\frac{5}{8}$	1 $\frac{7}{8}$
Length of ventrals .....	.....	1 $\frac{1}{8}$	.....	.....	.....
Length of snout, from a line joining the orbits	1 $\frac{3}{8}$	.....	.....	.....	.....
Distance from origin of anal to lateral line .....	.....	2 $\frac{5}{8}$	2 $\frac{7}{16}$	2 $\frac{1}{16}$	1 $\frac{1}{8}$
Number of dorsal rays	76	72	72	72	76
Number of anal rays	52	50	49	51	46

Another specimen had 73 dorsal and 53 anal rays. In consequence of the height and size of the prominences round the upper eye, the upper orbit is larger than the lower. The species appears to be rare; Girard saw only one specimen, and as yet I have only seen about twelve. It is taken outside the bay in deep water, probably near the Farallone Islands. The large eyeballs, protruding through the diminution of the pressure consequent on the removal of the fish to the surface, and overhanging, as it were, the short, snub snout, together with the bright brown tint, give this fish an unmistakable physiognomy even when viewed from above; and the curious prolongation of the dorsal on the left side, together with the brown markings, render it still more easy to identify when the blind side is exposed to view.

Is *Pleuronectes quadrituberculatus* Pall. (Zoog. Ross.-As. iii, p. 423, teste Günther) identical with the foregoing? The two "approximate, anteriorly situated" tubercles may very well be the prominent extremities of the interocular ridge; there is another "at the hinder margin of the upper orbit" (with, however, a second above it), and that above the opercle is large and prominent. The fin-rays, lateral line, and scales agree perfectly well with this species; but the proportion of depth to length is smaller, and "anal spine hidden" does not apply to the specimens of *cenosus* brought to this market. Yet the proportion of the body is within the range of variation of some of our other flat-fishes, and the anal spine is not prominent. It is also a suspicious circumstance that no one has ever identified Pallas's species.

If my surmise should prove correct, *cenosus* must of course sink into a synonym, and the name of the species will be *Pleuronichthys quadrituberculatus*.

In No. 4, the dorsal fin was not continued downwards nearly so far as in the others, agreeing thus more closely with Girard's description; the first ray was about level with the top of the upper lip, and only four

rays arose upon the blind side. In the same individual, no anal spine was discoverable outside of the skin; and the rays of the pectoral on the blind side were only ten, and on the colored side twelve.

In No. 5, no scales were discoverable on the vertical fins. One individual examined had three tubercles in a vertical line along the posterior margin of the upper eye.

PAROPHYRYS Girard.

Eyes and color on the right side. Form elongate-rhombic; anterior part of head narrow; snout conic. Eyes contiguous, nearly even, the upper looking obliquely upwards. Nostrils on horizon of superior margin of each orbit, anterior subtubular, posterior with anterior flap. Mouth unequal, little oblique; maxillary bones of colored side extending little beyond anterior margin of orbit, much shorter than that of blind side. Lips rather thin and simple. Teeth most developed on the blind side, in a single series, contiguous. An accessory lateral line. Lateral line with a very slight arch, almost straight, but somewhat raised in front. Scales cycloid, those on the cheeks similar. A recumbent spine before the anal. Caudal almost straight on posterior margin. Branchiostegals seven. Lower pharyngeals with a double row of teeth.

PAROPHYRYS VETULUS Girard.

Parophrys hubbardi Gill.

Pleuronectes digrammus Günther.

Parophrys vetulus Gill.

Parophrys vetulus Günther.

D. 74-86. A. 54-68. C. 3-6-1-5-3=18. P. 1-11. V. 6.

Body elongated, tapering posteriorly, less so anteriorly; the greatest width about a third of the total length; head one-fourth of the same, or rather less. Peduncle of tail rather slender, rather more than one-fifth of the greatest width. Outlines of posterior portion of body only very slightly curved; snout about $\frac{2}{3}$ of length of eye, narrow, its convexity meeting that of the anterior part of the dorsal outline above the centre of the pupil of the upper eye. Eyes from rather less to rather more than $\frac{1}{4}$ of the length of the head, elliptical, the lower in advance of the upper by a distance equal to about $\frac{2}{3}$ of the depth of the pupil; upper eye almost on a plane with the dorsal outline. Interocular space narrow, ridge-like, elevated, the ridge continued backwards and obliquely upwards round the posterior border of the upper eye, and then to the lateral line above the opercle. A short raised ridge along the anterior margin of the lower orbit. Nostrils of both sides in a slight depression; anterior of right side tubular, that of left side with a posterior linguiform flap. Mouth small, its cleft much longer on the blind side than on the colored; maxillary of the colored side scarcely passing the front margin of the orbit; mandible projecting in the closed mouth, its tip

level with the upper margin of the lower eye. Both intermaxillaries and mandibles are distorted, their symphyses bent round toward the colored side. Teeth small, short, broad, nearly equal, closely set, forming a nearly continuous cutting edge on the blind side in both jaws; about 40 teeth in the intermaxillary and 45 in the mandible on the blind side, and 2-3 on the colored side of each jaw, in a specimen $12\frac{3}{4}$ " long. Pharyngeal teeth blunt, broad, similar to those of jaws; each upper pharyngeal bone with about 12 teeth; each lower pharyngeal bone with a double row of teeth. Lower pharyngeals stout, separate. Gill-rakers of first arch rather slender, about one-fourth as long as the eye, the others decreasing regularly to the fourth arch, on which they are almost tubercular. Dorsal commencing over the centre of the pupil of the upper eye, considerably behind the posterior nostril of blind side; the number of rays very variable, the longest (39th-40th about) more than $\frac{1}{4}$ of the length of the head. Anal with a horizontal spine, its first ray arising at a vertical about the width of the pectoral base behind the posterior pectoral axil; the number of rays very variable; the longest (C. 18-20) opposite to those of the dorsal. Dorsal and anal coterminous at a distance from the caudal exceeding the depth of the caudal peduncle. Caudal truncated posteriorly, the outermost principal rays only very slightly longer than the central ones when closed, so that the fin when opened is slightly convex, the rays once bifurcate only. Pectoral of colored side usually about $\frac{1}{2}$ of the total length; the rays mostly once bifurcate, the two first excepted. Pectoral of blind side usually considerably shorter than that of the colored side; rays bifurcate, except the first three. Ventrals inserted with their posterior axil nearly in a line with the anterior axil of the base of the pectorals, their posterior extremity extending about to the anal spine; the posterior four rays bifurcate once or twice. Scales very small, smooth, extending over the head to the nostrils and over the base of the caudal, but not on the dorsal or anal. Snout and lower jaw scaleless. Scales of blind side similar. Each scale is sub-elliptical, longer than deep. Lateral line raised anteriorly, and with a very slight arch over the pectoral, thence straight to the end of the caudal; about 103-108 scales (in specimens $11\frac{1}{2}$ - $13\frac{3}{8}$ long) from base of caudal to head. Accessory lateral line ending at from the 26th to the 28th ray of the dorsal; an accessory line on the blind side also of about the same length. Color of body uniform reddish brown, sometimes spotted darker when fresh, especially in small specimens. Left side uniform whitish. Smaller specimens lighter in tint than larger.

Dimensions of several specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
Total length, to tip of caudal, in inches	$8\frac{5}{13}$	$9\frac{5}{16}$	$10\frac{1}{2}$	$11\frac{1}{2}$	$12\frac{3}{4}$	$13\frac{3}{8}$	$14\frac{5}{8}$
Greatest width of body	$2\frac{1}{3}$	$3\frac{1}{8}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{2}$	.....
Length of head	$1\frac{1}{16}$	$2\frac{9}{16}$	$2\frac{7}{16}$	$2\frac{1}{16}$	$3\frac{1}{8}$	$3\frac{3}{8}$	$3\frac{1}{2}$
Distance from tip of lower jaw to anal, in a straight line	$2\frac{5}{8}$	$2\frac{7}{8}$	.....	$3\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{5}{8}$	.....
Length of pectoral, colored side	$1\frac{1}{16}$	$1\frac{1}{8}$	.....	$1\frac{7}{16}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Length of pectoral, blind side	$\frac{1}{16}$	$\frac{3}{4}$	.....	$\frac{7}{8}$	$1\frac{3}{16}$	$1\frac{1}{2}$	$1\frac{1}{4}$
Length of ventrals	$\frac{9}{16}$	$\frac{5}{8}$	.....	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{5}{8}$	1
Length of orbit	$\frac{1}{2}$	$\frac{9}{16}$	.....	$1\frac{1}{16}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{3}{2}$
Approximate width of interocular space	$\frac{3}{32}$	$\frac{1}{8}$	.....	$\frac{5}{32}$	$\frac{5}{32}$	$\frac{1}{8}$	$\frac{7}{32}$
Width of peduncle of tail .....	.....	.....	.....	.....	.....	$1\frac{5}{16}$	$1\frac{5}{16}$
Length of lower jaw .....	.....	.....	.....	.....	.....	$1\frac{1}{2}$	.....
Length of snout	$\frac{1}{2}$	$\frac{3}{8}$	.....	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	.....
Origin of anal to lateral line .....	.....	.....	.....	.....	.....	.....	3
Number of rays in dorsal	78	81	79	81	85	86	80
Number of rays in anal	60	61	60	68	65	68	61

In other specimens, the formulæ of these fins were as follows: D. 77, A. 60; D. 74, A. 57; D. 75; A. c. 54. Thus the number of rays in the dorsal and anal fins is very variable, and is usually largest in the largest individuals, but not invariably so; the head also becomes slightly longer in proportion to the body as the size increases; and the largest specimens are the most slender. After close examination of several individuals, and comparison of many fresh specimens as they lay upon the stalls, exposed for sale, I have been forced to the conclusion that there is only one species of *Parophrys*, and that the *P. hubbardi* of Gill and the *P. digrammus* of Günther must sink to the rank of synonyms. *Parophrys vetulus* is of common occurrence in the markets, where it is present daily in greater or less abundance. Large specimens are equal in length to those of *Psettichthys melanostictus*. This species can be readily recognized by its narrow form, combined with the straight tapering lines of the posterior portion of the body, by the narrow anterior portion of the head, and by the smooth scales.

LEPIDOPSETTA Gill.

Form oval; eyes and color on the right side. Mouth small, the narrow maxillary reaching but little behind the anterior margin of the orbit of the lower eye; teeth in a single row, straight, forming a blunt continuous edge, most developed on the blind side. Anterior nostril of colored side tubular; that of blind side with a linguiform flap. Branchiostegals seven. Dorsal not extending in advance of the orbit; anal with a spine. Scales rough, usually ctenoid, sometimes sub-spinosely tuberculate on the cheeks. Lateral line arched anteriorly; an accessory dorsal branch.

LEPIDOPSETTA BILINEATA (Ayres) Gill.

Platessa bilineata Ayres.D. 71-84. A. 55-63. C. 3-12-3. P. 11. V. 6. $\frac{2}{5}$ L. lat. 82-86.

Form oval; dorsal profile regularly curved from the front margin of the upper eye to the caudal peduncle. Abdominal outline also a regular curve from the lower jaw, but less arched than the dorsal. Curve of snout uniting with that of nape over the anterior margin of the upper eye, forming a concavity. Height of body about $\frac{2}{5}$; length of head rather more than $\frac{1}{4}$ of the total length; greatest distance from anal to straight part of lateral line nearly equal to the length of the head. Snout projecting slightly, and considerably shorter than the eye. Eyes rather large, elliptical, their longitudinal diameter about $\frac{2}{9}$ of the length of the head, nearly even in front; the upper eye looking obliquely upwards. Interorbital space a very narrow, elevated, bony ridge, dividing anteriorly, and forming a raised ridge round the anterior margin of each eye. Nostrils of colored side in a depression about equidistant from the front margins of the two orbits; anterior tubular; posterior patulous; anterior nostril of blind side with a posterior tongue-like flap. Mouth very oblique; tip of mandible level with the upper margin of the lower eye, projecting when the mouth is closed, with a prominent symphysial knob. Length of mandible contained about $2\frac{2}{3}$ times in that of head. Maxillary reaching, but little behind the anterior margin of the orbit of the lower eye, and about $\frac{1}{3}$ of its transverse diameter below its lower margin. A single, rather irregular, tolerably closely set row of strong, blunt, conical teeth in each jaw, shorter and less developed on the colored side than on the blind. Teeth of intermaxillary not reaching above half-way along that bone on the colored side; those of mandible extending along $\frac{2}{3}$ of the exposed portion of that bone on the same side. About 34 teeth in the intermaxillaries, and about 32 in the mandible. Inferior pharyngeal teeth like those of jaws, but stouter, in a double row on each pharyngeal bone, the outer row rather the smaller; about 12 teeth in the inner row; superior similar, in a single row of about 7 on each pharyngeal bone. Inferior pharyngeal bones entirely separate, stout, broadest in the centre of their length, where the rows of teeth are farthest apart. Dorsal commencing immediately behind the anterior margin of the orbit; its first ray twisted toward the left, increasing regularly to about the 38th-40th rays, which are about $\frac{1}{5}$ of the length of the head, thence diminishing regularly to its termination opposite to that of the anal and distant from the caudal about half the width of its peduncle. Anal with a spine, its origin a little behind the base of the pectoral, its longest rays opposite to and equal in length to those of the dorsal; behind the longest rays the depth of the fin diminishes regularly. Narrowest part of caudal peduncle rather more than $\frac{1}{5}$ of the greatest depth, thence widening to the caudal without the intervention of a straight portion. Principal rays of caudal once bifurcate; its posterior margin slightly

convex. Pectorals pointed; that of colored side with 11-12 rays, the longest about $\frac{5}{11}$ of the length of the head; all the rays, except the first two, once bifurcate. Pectoral of blind side with 10-11 rays, the longest about $\frac{2}{3}$ as long as those of the colored side; the three or four lowest rays once bifurcate. Ventrals more than half their length in advance of the pectorals (reckoning from the front margins of both fins), contained about $3\frac{1}{4}$ times in the length of the head; the three posterior rays bifurcate. Gill-rakers short, very flexible, few, and widely separated. Scales of the anterior part of the body separate and almost circular, but towards the central portion they slightly overlap, and on the posterior portion are strongly imbricated. By far the larger portion of the scales on the anterior portion of the body and along the dorsal and abdominal regions, almost all those on the sub- and inter-opercula, a large proportion of those on operculum, and some of those on the suborbital region smooth, subcircular. On the central portion of the length, especially near the lateral line, scales with two or three spinules appear, and these become more numerous and more decidedly ctenoid farther backwards, extending quite across the body on its posterior third. Scales of cheeks not imbricated, similar in shape to those of body; the posterior portion of their surface covered with numerous spinules (number variable) directed upwards. Near the interorbital space these spinules cover the greater portion of each scale. These spinulose scales extend upwards level with the upper margin of the upper eye; and there are numerous scales of a similar character on the operculum, and sometimes a few upon the sub- and inter-opercula. A few isolated scales below the pectoral resemble those on the cheeks. Each of the scales on the cheeks with a distinct pit, producing a punctate appearance. In some specimens spinulose scales are scattered over the anterior parts. Scales of blind side smooth; preoperculum scaleless. Accessory lateral line of variable length, connected with the main lateral line by a branch and sometimes with a short separate row of pores above; accessory lateral line of blind side shorter. Lateral line with a bold curve, six scales high (in an oblique row) above pectoral, anteriorly decurrent to nearly its former direction. A row of pores round the lower eye. Rays of the caudal covered with scales on both blind and colored sides. A row of scales along the greater portion of the length of the central rays of the dorsal on the colored side and on a portion of the anal, but no scales upon the anterior or posterior rays of either fin on that side, nor on either dorsal or anal on the blind side. The scales of the body are largest on the posterior portion and on the caudal peduncle, where they are elongated, and measure about $\frac{5}{32}$ in length. Color light grayish, yellowish, or reddish brown, with irregularly placed blotches of whitish on the body; often with five large light blotches along the dorsal and five along the abdominal margin. Blind side white. Dorsal fin sometimes with blotches on colored side.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length, in inches.....	13 $\frac{3}{16}$	14 $\frac{1}{2}$	14 $\frac{5}{8}$	13 $\frac{1}{16}$	14 $\frac{1}{16}$
Greatest depth of body.....	5 $\frac{1}{2}$	5 $\frac{3}{4}$	5 $\frac{3}{4}$	5 $\frac{5}{8}$	5 $\frac{1}{4}$
Length of head.....	3 $\frac{7}{16}$	3 $\frac{1}{8}$	3 $\frac{5}{8}$	3 $\frac{3}{8}$	3 $\frac{3}{8}$
Length of snout, from a line joining the front margins of the orbits.....	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$
Longitudinal diameter of lower orbit.....	$\frac{1}{16}$		$\frac{1}{16}$	$\frac{3}{32}$	$\frac{3}{32}$
Interocular width.....	$\frac{1}{16}$	$\frac{1}{16}$		$\frac{3}{32}$	$\frac{3}{32}$
Length of mandible.....			1 $\frac{3}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$
Length of pectoral, colored side.....	1 $\frac{9}{16}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	1 $\frac{9}{16}$	1 $\frac{1}{2}$
Length of pectoral, blind side.....	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{16}$	1	1
Length of ventrals.....	1 $\frac{1}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{3}{32}$	1 $\frac{1}{16}$
Tip of snout to origin of anal.....	4 $\frac{3}{8}$	4 $\frac{7}{8}$	5	4 $\frac{1}{2}$	4 $\frac{1}{8}$
Length of longest rays of dorsal.....	1 $\frac{1}{4}$	1 $\frac{3}{16}$	1 $\frac{9}{16}$	1 $\frac{1}{16}$	1 $\frac{7}{16}$
Width of caudal peduncle.....	1 $\frac{1}{8}$	1 $\frac{1}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{8}$
Greatest distance from anal to straight part of lateral line.....			3 $\frac{5}{8}$	3 $\frac{1}{4}$	3

The accessory lateral line varies considerably. In No. 1, it can be traced to below the fortieth dorsal ray; the portion anterior to the branch connecting it with the main lateral line runs obliquely upwards to immediately below the sixth dorsal ray; and there is a short line of about eleven pores above the principal accessory lateral line, commencing at the tenth dorsal ray and continuing to the fifteenth. In No. 2, there is no second accessory row of pores, and the accessory lateral line terminates between the fifteenth and sixteenth dorsal rays. Anteriorly this line divides and again unites, surrounding a small space, and then again divides into two branches, the lower of which receives the connecting branch from the main lateral line. In No. 3, the accessory lateral line ends just behind the sixteenth dorsal ray, and has two branches inclined upward, the anterior surrounding a space. On the blind side of No. 4, I could only find ten pectoral rays. On the blind side of Nos. 4 and 5, the accessory lateral line, which ends under the 14th dorsal ray, curves boldly downwards and then backwards to meet the main lateral line, and sends a short branch obliquely forwards. On the colored side the arrangement is similar in No. 5; but in No. 4 a space is surrounded by the pores at the junction of the dorsal accessory with the branch leading to the lateral line.

This large mottled "Sole" (as it is called) is taken outside of the bay, usually, if I am rightly informed, in the vicinity of the Farallones, and is rather rare. Those brought in are usually of tolerably large size, the specimens measured being of about average dimensions. It is reputed of delicate flavor. It may be readily recognized by its light yellow tint, with white markings, its regularly oval form, and its extremely narrow interocular space.

The formulae of the dorsal and anal in the individuals measured were as follows: No. 1, D. 78, A. 57; No. 2, D. 76, A. 61; No. 3, D. 71, A. 55; No. 4, D. 76, A. 61; No. 5, D. 84, A. 63.

In No. 4, the last two or three rays of the dorsal and anal were once bifurcate; and in both No. 4 and No. 5, those rays of the dorsal and anal

which inclined forwards (about 25 in No. 4 and about 30 in No. 5) were without scales. In Nos. 4-5, the length of the arch of the lateral line was two inches, its rise half an inch, and the number of pores between caudal and head 82 and 86 respectively.

LEPIDOPSETTA UMBROSA (Grd.) Gill.

Platichthys umbrosus Girard.

D. 85-90. A. 66-68. C. 3-12-3. P. 11-12. V. 6. L. lat. 82-86.

Body ellipsoid, regularly and about equally curved on dorsal and abdominal profiles; snout strongly curved, its curve meeting that of the dorsal outline at a considerable angle opposite the front margin of the upper orbit; lower margin of head and that of mandible almost in the same line. Greatest depth of body contained $2\frac{1}{4}$ - $2\frac{3}{4}$ times, that of head $4\frac{1}{5}$ - $4\frac{3}{4}$, in the total length; eye about 6 times, snout (measured from a line joining the anterior margins of the orbits) about $5\frac{1}{2}$ times, in the length of the head; caudal peduncle $4\frac{1}{2}$ times in the greatest depth of the body. Nostrils of colored side in a horizontal line with the centre of the interocular space, anterior tubular, posterior patulous; anterior nostril of blind side with a posterior linguiform flap. Eyes small, lateral, even in front, the upper anterior part of the orbit of the upper eye nearly reaching the dorsal outline at the point of its junction with the snout. Interocular space equal in width to about $\frac{1}{3}$ the longitudinal diameter of the eye; the surface flat, not elevated, without ridges or tubercles. Mouth small, its cleft oblique; lower jaw projecting in the closed mouth, and level with the upper margin of the lower eye; maxillary ending about half-way between the front margin of the orbit and that of the pupil. Teeth in a single row on both sides of both jaws; about 14 on the colored and 23 on the blind side of the mandible, and 20 on the colored and 23 on the blind side of the intermaxillaries in a specimen a little over 9" long. Teeth conical, rather short and stout; the largest in front of both jaws, the smallest on the colored side of the intermaxillary. Upper pharyngeal teeth in a single row of 6-8 teeth similar to those in jaws; lower pharyngeals separate, each with a double row of similar teeth. Gill-rakers short, flexible; branchiostegals seven. Dorsal commencing above anterior margin of eye; the first ray slightly turned to the left at its origin; the longest rays (about the 38th-48th) about equal in length to the pectoral of the right side, thence decreasing regularly to its termination, opposite to that of anal, at a distance from the caudal equal to about half the depth of the peduncle. Anal with a more or less conspicuous spine, very slowly increasing in height to the 30th-38th rays, which are equal in length and opposite to the longest dorsal rays. By far the larger portion of the rays of the dorsal and anal are directed backwards. Origin of anal considerably behind the pectoral base. Greatest depth between anal and straight portion of lateral line somewhat less than the length of the head. Caudal peduncle slightly wedge-shaped; caudal convex posteriorly, the central rays considerably longest; outer ray about $\frac{1}{3}$, second ray about $\frac{2}{3}$, the length

of the third ray on each side; rays usually only once bifurcate. Ventrals small; their posterior axil about half the width of the pectoral base in advance of the anterior axil of that fin, their tips extending beyond the anus; four lower rays bifurcate. Pectoral of colored side lanceolate, about half the length of the head; third ray longest, second slightly shorter; all the rays but the three uppermost once bifurcate. Pectoral of blind side shorter, the central rays longest; most of the rays once bifurcate. Scales of body and cheeks ctenoid, the spines well developed, those on the cheeks similar; no stellate or rugose scales on any part. Small ctenoid scales on interorbital area; snout and lower jaw scaleless. A row of ctenoid scales along each ray of dorsal and anal fins on the colored side, except upon a few of the anterior rays and those posterior ones which incline forwards. The scales extend to the tips of the rays. Similar scales upon the colored side of the caudal for the greater portion of the length, and some on the outside of the pectoral. Scales of blind side smooth; preopercular bone scaleless; the other opercular bones partially so. A row of smooth scales along the front edge of each ray of the central portion of dorsal and anal on the blind side, not extending above $\frac{1}{3}$ of the length. Lateral line with about 82-86 scales; a more or less conspicuous arch above the pectoral, in most cases rising about two scales high. Accessory lateral line ending below the 23d-27th dorsal ray on the colored side, and below the 16th-24th ray on the blind side. A branch from the main lateral line joins the accessory line a little posterior to its origin, the accessory line forming an obtuse angle, or sometimes branching, at the junction. Color nearly uniform grayish brown on the colored side; blind side white. Each scale of colored side with a dark band behind the spines, then a light area. Fins on colored side nearly the same color as the body.

Dimensions.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Total length, in inches	9 $\frac{3}{8}$	10 $\frac{1}{4}$	9 $\frac{5}{8}$	9 $\frac{5}{8}$	8 $\frac{7}{8}$
Length without caudal	9 $\frac{3}{8}$	9	7 $\frac{1}{4}$	7 $\frac{1}{8}$	7
Greatest depth of body	3 $\frac{1}{2}$	4 $\frac{1}{2}$	3 $\frac{5}{8}$	3 $\frac{3}{8}$	3
Greatest distance between anal and straight portion of lateral line	1 $\frac{1}{8}$		2 $\frac{1}{8}$	2 $\frac{1}{2}$	1 $\frac{1}{8}$
Tip of lower jaw to origin of anal	2 $\frac{3}{4}$	3 $\frac{1}{2}$	2 $\frac{1}{8}$	2 $\frac{3}{4}$	2 $\frac{3}{4}$
Length of head	2	2 $\frac{3}{8}$	2	2 $\frac{3}{8}$	1 $\frac{5}{8}$
Length of snout, from upper eye	$\frac{1}{2}$	$\frac{1}{2}$			$\frac{1}{2}$
Longitudinal diameter of eye	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$
Width of interocular space			$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
Length of lower jaw			3 $\frac{1}{2}$	3	3
Length of pectoral, colored side	1	1 $\frac{3}{8}$	3 $\frac{1}{2}$	1 $\frac{3}{8}$	1
Length of pectoral, blind side	2	1 $\frac{3}{8}$	1 $\frac{3}{8}$	2	1 $\frac{3}{8}$
Length of ventrals			$\frac{1}{2}$	1 $\frac{3}{8}$	$\frac{1}{2}$
Width of caudal peduncle	3 $\frac{1}{2}$	3	3 $\frac{1}{2}$	3	3 $\frac{1}{2}$
Length of longest dorsal rays			3 $\frac{1}{2}$	1 $\frac{3}{8}$	
Length of longest anal rays			3 $\frac{1}{2}$	1 $\frac{3}{8}$	
Number of dorsal rays	88	85	90	90	85
Number of anal rays	68	66	68	67	66
Lateral line		ca. 86	ca. 84	ca. 82	

This species is not brought to market in large numbers, and is sold under the name of "Sole." Those I have seen on the stalls average about the same size as those of which the measurements are given. In No. 5, the lateral line is almost straight. It is easily distinguished by its highly etenoid scales of uniform character, its small eyes, and dull gray color.

It is evident from the dimensions of the various species given in the preceding pages, that the number of dorsal and anal fin-rays and the proportional width of the interocular space are subject to great variation in all the species. I am inclined to believe that, as a rule, the interocular space increases in proportional width with the age of the fish, since, although two fishes of the same size may differ in this respect, or the smaller of two not greatly differing in size may have the wider interorbital area, yet very large specimens invariably have this space relatively wider than very small ones. The number of pectoral rays is also inconstant.

I much regret that, as I have only seen one specimen of the *Hippoglossus* of this coast, I am at present unable to settle the question of its identity with the European species; but I expect to be able to do this before many months have passed.

In conclusion, I have to thank Mr. W. G. W. Harford, the Director of the Museum of the California Academy of Sciences, for his courtesy and his assistance in many ways.

MAY 14, 1879.

A PRELIMINARY CATALOGUE OF THE FISHES OF THE ST. JOHN'S RIVER AND THE EAST COAST OF FLORIDA, WITH DESCRIPTIONS OF A NEW GENUS AND THREE NEW SPECIES.

By G. BROWN GOODE.

In the following list are enumerated the species of fishes known, or supposed to occur, in the waters of East Florida. Those which have not been observed by the writer, or by other recent explorers, are marked by asterisks. The occurrence of all these species is almost absolutely certain, for, with one or two exceptions, they have been taken on the Atlantic coast north of Florida, and to the south and west in the Gulf of Mexico or the Antilles. Any information regarding the occurrence of these or other species in East Florida is solicited.

In a more extended paper, now almost ready for the press, the habits, geographical distribution, and economical history of these species will be discussed. Of the 223 species here catalogued, 33 only have been taken north of Cape Cod.

SMITHSONIAN INSTITUTION, May 26, 1879.

MALTHEIDÆ.

1. *Malthe cubifrons*, Richardson.
St. Augustine.
2. *Halieutichthys aculeatus*, (Mitchill) Goode.*
Described by Mitchill from the Bahama Straits in 1815.

ANTENNARIIDÆ.

3. *Pterophryne histrio*, (Linn.) Gill.
St. Augustine; mouth of St. John's.
4. *Antennarius pleurophthalmus*, Gill.*
Described from Key West.
5. *Antennarius annulatus*, Gill.*
Described from Garden Key.

ORTHAGORISCIDÆ.

6. *Mola rotunda*, Cuvier.—*Sun-fish*.
Mouth of St. John's.

DIODONTIDÆ.

7. *Chilomycterus geometricus*, (Schneider) Kaup.—*Toad-fish*; *Porgy*.
Mouth of St. John's, Indian River.
8. *Diodon hystrix*, Linn.*

TETRODONTIDÆ.

9. *Lagocephalus lævigatus*, (Linn.) Gill.—*Rabbit-fish*.
Mouth of St. John's.
10. *Cirrisomus turgidus*, (Mitchill) Jordan & Gilbert.
Mouth of St. John's.
11. *Cirrisomus testudineus*, (Linn.) Jordan & Gilbert.*—*Globe-fish*.
12. *Cirrisomus Spengleri*, (Bloch) Jordan & Gilbert.*

OSTRACIONTIDÆ.

13. *Ostracion trigonus*, Linn.
St. Augustine; Matanzas; Cumberland Island, Ga.
14. *Ostracion quadricornis*, Linn.*

BALISTIDÆ.

15. *Alutera Schœpfii*, (Walbaum) Goode & Bean
16. *Alutera scripta*, (Osbeck) Bleeker.*
17. *Monacanthus occidentalis*, Günther.
18. *Balistes caprisus*, Linn.*
19. *Balistes vetula*, Linn.*

SYNGNATHIDÆ.

20. *Syngnathus fuscus*, Storer.
St. John's River.

HIPPOCAMPIDÆ.

21. *Hippocampus antiquorum*, Linn.
St. John's River.

SOLEIDÆ.

22. *Achirus lineatus*, (Linn.) Cuvier.—*Choke-fish*.
St. John's River.
23. *Aphoristia plagiusa*, (Linn.) Jordan & Gilbert.*

PLEURONECTIDÆ.

24. *Pseudorhombus dentatus*, (Linn.) Günther.—*Flounder*.
St. John's River; St. Augustine.
25. *Pseudorhombus quadrocellatus*, (Gill) Jordan & Gilbert.*
Pensacola; Charleston.
26. *Citharichthys spilopterus*, Günther.
Mouth of St. John's.

OPHIDIIDÆ.

27. *Leptophtidum profundorum*, Gill.
Described from Gulf Stream off coast of Florida.

BLENNIIDÆ.

28. *Labrosomus nuchipinnis*, (Quoy & Gaimard) Poey.*
The Museum has specimens from South Carolina.

BATRACHIDÆ.

29. *Batrachus tau*, (Linn.) Cuv.
Mouth of St. John's.

URANOSCOPIDÆ.

30. *Uranoscopus y-græcum*, Cuv. & Val.
New Berlin; St. Augustine.
31. *Astroscopus anoplus*, (Cuv. & Val.) Brevoort.*

GOBIIDÆ.

32. ? *Gobius carolinensis*, Gill.
Arlington.
33. *Gobiosoma alepidotum*, (Schneider) Girard.*
34. *Dormitator lineatus*, Gill.*

TRIGLIDÆ.

35. *Dactylopterus volitans*, (Linn.) Cuv.
St. Augustine; mouth of St. John's.
36. *Prionotus punctatus*, (Bloch) Cuv.*
37. *Prionotus tribulus*, Cuv. & Val.
St. Augustine.

LABRIDÆ.

38. *Chærojulis grandisquamis*, Gill.*
Described from Cape Hatteras, and known from no other locality.
39. *Xyrichtys lineatus*, (Gmelin) Cuv. & Val.

POMACENTRIDÆ.

40. *Glyphidodon saxatilis*, (Linn.) Cuvier.*

CHÆTODONTIDÆ.

41. *Holocanthus ciliaris*, (Linn.).*

XIPHIIDÆ.

42. *Xiphias gladius*, Linn.—*Sword-fish*
Off mouth of St. John's.
43. *Tetrapturus albidus*, Poey.*
44. *Tetrapturus amplus*, Poey.*
45. *Histiophorus gladius*, (Brouss.).
Between Savannah and Indian River, April, 1879.

TRICHIURIDÆ

46. *Trichiurus lepturus*, Linn.
Jacksonville and elsewhere.

SCOMBRIDÆ.

47. *Orcynus alliteratus*, (Rafinesque) Gill.*
48. *Sarda pelamys*, (Linn.) Cuv.*
49. *Cybium maculatum*, (Mitchill) Agassiz.—*Spanish Mackerel*.
50. *Cybium regale*, (Bloch) Cuvier.—*King-fish*.
51. *Cybium caballa*, Cuv. & Val.—*King-fish*.

CARANGIDÆ.

52. *Vomer setipinnis*, (Mitchill) Ayres.*
53. *Selene geometrica*, (Mitchill) Goode.*
54. *Argyreosus vomer*, (Linn.) Cuv. & Val.
St. John's River, at Jacksonville.
55. *Decapterus punctatus*, (Agassiz) Gill.*
56. *Decapterus macarellus*, (Cuv. & Val.) Poey.*
57. *Trachuropus crumenophthalmus*, (Bloch) Gill.*

58. *Paratractus pisquetus*, (Cuv. & Val.) Gill.*

59. *Carangus hippos*, (Linn.) Gill.—*Crevallé*.

Mouth of St. John's River.

60. *Carangus fallax*, (Cuv. & Val.) Girard.*

61. *Carangus chrysos*, (Mitchill) Girard.

St. John's River, near its mouth.

62. *Carangops falcatus*, (Holbrook) Gill.*

63. *Carangoides cibi*, Poey.*

64. *Blepharis crinitus*, (Akerly) DeKay.*

65. *Chloroscombrus chrysurus*, (Linn.) Gill.

St. John's River, at Arlington.

66. *Trachynotus carolinus*, (Linn.) Gill.—*Pompano*; *Jack* (St. Augustine).

Frequently taken at the mouth of the St. John's.

67. *Trachynotus ovatus*, (Linn.) Günther.*

68. *Trachynotus glaucus*, (Bloch) Cuv. & Val.*

69. *Trachynotus goreensis*, Cuv. & Val.*

70. *Naucrates ductor*, (Linn.) Rafinesque.—*Pilot-fish*.

71. *Seriola fasciatus*, (Bloch) Cuv. & Val.*

72. *Seriola zonata*, (Mitchill) Cuv. & Val.*

73. *Seriola Boscii*, Cuv. & Val.*

Originally described from South Carolina. It should be looked for.

STROMATEIDÆ.

74. *Peprilus alepidotus*, (Linn.) Cuvier.

Fernandina.

BRAMIDÆ.

75. *Pteraclis carolinus*, Cuv. & Val.*

Originally described from the Carolinas. To be looked for.

BERYCIDÆ.

76. *Holocentrum rufum*, (Walbaum) Goode.*

SCIÆNIDÆ.

77. *Cynoscion carolinensis*, (Cuv. & Val.) Gill.—*Sea Trout*.

Very common.

78. *Cynoscion regalis*, (Schneider) Gill.*

The occurrence of this species needs confirmation.

79. *Cynoscion nothus*, (Holbrook) Gill.—*Shad Trout*.

Mouth of the St. John's and St. Augustine.

80. *Cynoscion thalassinus*, (Holbrook) Gill.

A species of doubtful permanence.

81. *Pogonias chromis*, (Linn.) Cuvier.—*Drum*.

Very common.

82. *Liostomus xanthurus*, Lacépède.*

Doubtfully distinct from *L. philadelphicus*.

83. *Liostomus philadelphicus*, (Linn.) Goode.—*Bezuga* or *Masooka*; *Oldwife* or *Spot*.
Very common.
84. *Stelliferus lanceolatus*, (Holbrook) Gill.
Matanzas River Inlet.
85. *Bairdiella argyroleuca*, (Mitchill) Gill.—*Yellow-tail*.
Very common.
86. *Sciænops ocellatus*, (Linn.) Gill.—*Channel Bass*; *Red-fish*; *Red Horse*.
Very common.
87. *Menticirrus alburnus*, (Linn.) Gill.—*Whiting*
Very common.
88. *Menticirrus nebulosus*, (Mitchill) Gill.
The southern range of this species needs determination.
89. *Menticirrus littoralis*, (Holbrook) Gill.*
No specimens observed.
90. *Micropogon undulatus*, (Linn.) Cuv. & Val.—*Croaker*.
Very common.
91. *Larimus fasciatus*, Holbrook.*
The southern range of this species needs determination.

GERRIDÆ.

92. *Eucinostomus argenteus*, B. & G.*

PIMELEPTERIDÆ.

93. *Pimalepterus Boscii*, Cuv. & Val.*

SPARIDÆ.

94. *Lagodon rhomboides*, (Linn.) Holbrook.—*Sailor's Choice*.
Very common.
95. *Archosargus probatocephalus*, (Walbaum) Gill.—*Sheephead*.
Very common.
96. *Stenotomus argyrops*, (Linn.) Gill.*
The southern limit of this species needs determination.
97. *Sparus chrysops*, Linn.,* (= *Sparus aculeatus*).
98. *Sargus Holbrookii*, Bean.*
Charleston.
99. *Pagrus argenteus*, Schneider.*
Charleston.

PRESTIPOMATIDÆ.

100. *Hæmulon arcuatum*, Cuv. & Val.—*Squirrel-fish*?
St. Augustine.
101. *Hæmulon formosum*, (Linn.) Cuvier.*—Probably the *Pig-fish* or *Grunt* of Indian River.
102. *Hæmulon chrysopteron*, (Linn.) Cuvier.—Probably the *Flannel-mouth Porgy* of the Mayport fishermen.
103. *Pristipoma fulvomaculatum*, (Mitchill) Günther.*
Proc. Nat. Mus. 79—8 Sept. 19, 1879.

104. *Anisotremus virginicus*, (Linn.) Gill.*
 105. *Rhomboplites aurorubens*, (Cuv. & Val.) Gill.*
 106. *Lutjanus Blackfordii*, Goode & Bean.—*Red Snapper*.
 St. John's Bar.

107. *Lutjanus caxis*, (Schneider) Poey.*—*Gray Snapper*.

The occurrence of this species on east coast of Florida is probable, yet not demonstrable.

108. *Ocyurus melanurus*, (Linn.) Goode.*
 Occurs at the Bahamas.

APHODODERIDÆ.

109. *Aphododerus Sayanus*, (Gilliams) DeKay.*

CENTRARCHIDÆ.

110. *Chænobryttus viridis*, (Cuv. & Val.) Jordan.—*War-mouth Perch*.
 St. John's and tributaries.
111. *Ambloplites rupestris*, (Raf.) Gill.*
112. *Lepiopomus mystacalis*, (Cope) Jordan.
 Attributed to Florida by Jordan.
113. *Lepiopomus apiatus*, Cope.—*Chinquapin Perch*.
 Arlington and Jacksonville.
114. *Lepiopomus elongatus*, (Holbrook) Gill & Jordan.
 Not seen. Described from St. John's by Holbrook.
115. *Lepiopomus auritus*, (Linn.) Raf.—*Red-bellied Perch*.
 St. John's and tributaries.
116. *Lepiopomus incisor*, (Cuv. & Val.) Goode & Bean.—*Copperhead Bream*.
 St. John's and all fresh and brackish waters in Florida.
117. *Xystroplites gillii*, Jordan.*
 Described from Key West.
118. *Xystroplites longimanus*, Cope.
 Described from "Florida."
119. *Xenotis marginatus*, (Holbr.) Jordan.
 Not seen; described from St. John's.
120. *Eupomotis aureus*, (Walbaum) Gill & Jordan.—*Bream*.
 Common in all fresh waters of Florida.
121. *Eupomotis speciosus*, (Holbrook) Gill & Jordan.—*Bream*.
 Common in St. John's.
122. *Enneacanthus obesus*, (Girard) Gill.
 Not seen; identified by Jordan with *Bryttus fasciatus* Holbrook, described from the St. John's.
123. *Enneacanthus gloriosus*, (Holbr.) Jordan.
 Florida, *vide* Jordan.
124. *Enneacanthus milnerianus*, Cope.
 Florida, *vide* Cope.
125. *Pomoxys nigromaculatus*, (Les.) Girard.—*Speckled Perch*.
 St. John's and tributaries.

126. *Micropterus pallidus*, (Raf.) Gill & Jordan.—*Trout*.
Common in all fresh and brackish water.

SERRANIDÆ.

127. *Promicropterus maculatus*, (Holbrook) Gill.*
128. *Epinephelus morio*, (Cuv. & Val.) Gill.—*Brown Snapper*.
St. John's Bar, etc.; Indian River.
129. *Epinephelus nigritus*, (Holbrook) Gill.—*Black Grouper*; *Warsaw* (West Florida).
Indian River.
130. *Epinephelus niveatus*, Val.*
131. *Epinephelus Drummond-Hayi*, Goode & Bean.
132. *Trisotropis brunneus*, Poey.*
133. *Centropristis atrarius*, (Linn.) Barnev.—*Black-fish*.
Entire eastern coast.
134. *Promicrops guasa*, (Poey) Gill.
New Berlin, etc.
135. *Triloburus trifurcus*, (Linn.) Gill.*
Has this species been observed since the days of Linnæus and Garden?
136. *Diplectrum fasciculare*, (Cuv. & Val.) Holbrook.*
137. *Dules auriga*, Cuv. & Val.*

CENTROPOMIDÆ.

138. ? *Centropomus undecimalis*, Cuv. & Val.
Jupiter Inlet.

LABRACIDÆ.

139. *Roccus lineatus*, (Bloch) Gill.—*Rock-fish*.
St. John's River.

EPHIPPIIDÆ.

140. *Parephippus quadratus*, (Gmel.) Gill.*
141. *Parephippus faber*, (Cuv.) Gill.*

LOBOTIDÆ.

142. *Lobotes surinamensis*, (Bloch) Cuvier.—*Grouper*.
St. John's River, at Arlington.

POMATOMIDÆ.

143. *Pomatomus saltatrix*, (Linn.) Gill.—*Skip-jack*; *Saltwater-jack*.

ELACATIDÆ.

144. *Elacate canadus*, (Linn.) Gill.—*Sergeant-fish* (Indian River); *Cobio* (Brunswick, Ga.).
Indian River (S. C. Clarke). Brunswick, Ga.

CHILODIPTERIDÆ.

145. *Apogonichthys americanus*, Castelnau.*

PRIACANTHIDÆ.

146. *Priacanthus macrophthalmus*, Cuv.*

ECHENEIDIDÆ.

147. *Echeneis naucrateoides*, Zuiew.*
 148. *Echeneis naucrates*, Linn.
 Mouth of St. John's.
 149. *Rhombochirus osteochir*, (Cuv.) Gill.*
 150. *Remora brachyptera*, (Lowe).*
 151. *Remora jacobæa*, (Lowe) Gill.*

SPHYRÆNIDÆ.

152. *Sphyræna picuda*, Schn.*
 South Florida (Blackford).

MUGILIDÆ.

153. *Mugil albula*, Linn.—*Striped Mullet*.
 St. John's River and coast.
 154. *Mugil brasiliensis*, Agassiz.—*White Mullet*.

ATHERINIDÆ.

155. *Chirostoma peninsulæ*, Goode & Bean.*
 Lake Monroe.
 156. *Chirostoma vagrans*, Goode & Bean.*

BELONIDÆ.

157. *Belone longirostris*, (Mitchill) Gill.
 St. John's River.
 158. *Belone hians*, Cuv. & Val.*
 159. *Belone latimanus*, Poey.*
 160. *Belone notata*, Poey.*

SCOMBERESOCIDÆ.

161. *Exocætus*, sp.
 162. *Hemorhamphus unifasciatus*, Ranzani.*
 163. *Euleptorhamphus longirostris*, (Cuv. & Val.) Gill.*
 164. *Scombresox saurus*, (Walb.) Günther.*
 The southern limit of this species should be made out.

* For descriptions of these two species see paper following this, "Catalogue of a Collection of Fishes sent from Pensacola, Florida, and Vicinity, by Mr. Silas Stearns, with Descriptions of Six New Species."

ESOCIDÆ.

165. *Esox phaleratus*, Say. (Doubtful species.)

Described from a locality between Tokoi and St. Augustine.

166. *Esox reticulatus*, Le Sueur?—Jack.

167. *Esox Ravenelii*, Holbrook.*

CYPRINODONTIDÆ.

168. *Cyprinodon variegatus*, Lacépède.

St. Augustine; Lake Monroe.

169. *Jordanella floridæ*, gen. et sp. nov., Goode & Bean.

Three specimens, of a remarkable type, allied to *Cyprinodon*, were collected in Lake Monroe, Florida, by Professor Baird (No. 18062), associated with *C. variegatus*. The species appears to be generically distinct from *Cyprinodon*, and the genus, for which the name *Jordanella* is proposed, in honor of Prof. D. S. Jordan, is characterized by its long dorsal and anal fins, the dorsal having 16 rays, preceded by a stout, thick spine, the anal I, 12 or 13, and by the position of the ventrals, which are situated in advance of the dorsal, and also by the advanced position of the anal, the posterior end of which is in advance of that of the dorsal. In other respects it agrees with *Cyprinodon*.

The species may be characterized as follows:

Diagnosis.—Height of body contained $2\frac{1}{4}$ to $2\frac{1}{2}$ times in total length without caudal ($2\frac{1}{2}$ to $2\frac{3}{4}$ times with caudal). Humeral scale behind gill-opening equal to or little larger than the others. Snout as in *Cyprinodon variegatus*. Diameter of eyes contained $3\frac{1}{2}$ times in length of head, and equal to $\frac{2}{3}$ of the width of the interorbital space. Origin of dorsal midway between end of snout and base of caudal, and above the ninth or tenth scale of the lateral line, and is behind the vertical from the root of the ventrals. Pectoral as long as the caudal, and $\frac{2}{3}$ as long as the head. The ventral reaches to the vent, its length equal to half that of the head. The origin of the anal is under the fifth dorsal ray, and its posterior ray is in advance of the last dorsal ray. Mandible about as long as the eye. The sexual characters cannot be made out from the series of specimens studied by us. Color olivaceous above, yellowish brown below, with traces of vertical bands of blackish brown, and with longitudinal lines upon each series of scales, resembling those in *Mollienisia*, but less conspicuous. A blackish blotch upon the side, under the origin of the dorsal, and about as large as the eye; a smaller one on the posterior limb of the dorsal.

D. I, 16; A. I, 12–13. L. lat. 25–26; L. transv. 12.

170. *Zygonectes chrysotus*, (Günther) Jordan.

St. Augustine; Arlington.

171. *Fundulus seminolis*, Girard.

Lake Monroe. (Described from Palatka.)

172. *Fundulus floridensis*, Le Sueur.

Described from "Charlotte Bay" (*sic*), Florida.

173. *Fundulus confluentus*, sp. nov., Goode & Bean.

A single specimen (No. 18065) obtained by Professor Baird in Lake Monroe.

Height of body a little less than four times in total length (without caudal); length of head two-sevenths. Head low, flat. Snout not produced, its length equal to that of the eye. Mandible equal to the eye. Width of interorbital space half that of the head. Diameter of eye contained four times in length of head, and twice in width of interorbital space. Origin of the dorsal midway between the tip of the caudal and the middle of the eye. First anal ray under second dorsal ray. Anal higher than long. Yellowish gray, with longitudinal lines down the center of each dorsal and lateral row of scales, and with fourteen or more distinct, irregular, vertical bands. In general appearance it resembles *Hydrargyra majalis*. The scales are much crowded, there being at least 45 transverse rows of scales. There appear to be only five branchiostegals, though this point is not certainly ascertained, the specimen being imperfect.

D. 10; A. 10; V. 6.

174. *Fundulus heteroclitus*, (Linn.) Gill.

And other species?

175. *Hydrargyra swampina*, Lac.*

Described from Florida.

176. *Hydrargyra majalis*, (Walb.) Val.

Mouth of St. John's.

177. *Gambusia arlingtonia*, sp. nov., Goode & Bean.

Numerous specimens (No. 21308) obtained in the Arlington River.

Height of body contained four times in total length, without caudal; the length of the head three and one-third. Snout broad. lower jaw projecting. Diameter of eye much greater than length of snout (double in young), one-third to two-fifths (in young) of that of the head, and two-thirds the width of the interorbital space. My specimens appear to be both females. In them the origin of the dorsal is midway between the tip of the tail and the posterior margin of the eye and opposite the sixth anal ray. The pectoral fins extend to the vertical from the insertion of the ventrals, which terminate at the vent and in front of the anal; length of base of anal equal to half its distance from the insertion of the caudal. Color uniform brownish olive. In the smaller specimens two or three series of blackish dots on the dorsal and anal fins.

D. 9; A. 11; V. 6. L. lat. 33; L. transv. 11.

178. *Gambusia Holbrooki*, (Agassiz) Girard.

Described from Palatka.

179. *Mollinesia latipinna*, Le Sueur.

St. Augustine.

- 180. *Girardinus formosus*, Agassiz.

Specimens obtained in Florida by Mr. T. Glover.

SYNODONTIDÆ.

181. *Trachinocephalus myops*, (Schneider) Gill.*

182. *Synodus foetens*, (Linn.) Gill.*

ALBULIDÆ.

183. *Albula vulpes*, (Linn.) Goode.*

ELOPIDÆ

184. *Megalops cyprinoides*, (Bloch).—*Tarpum*; *Jew-fish*.

185. *Elops saurus*, Linn.*

CLUPEIDÆ.

186. *Brevoortia tyrannus*, (Latrobe) Goode.—*Fat-back*.

St. John's and coast.

187. *Alosa sapidissima*, (Wilson) Linsley.—*White Shad*.

St. John's and coast.

188. *Opisthonema thrissa*, (Linn.) Gill.*

189. *Pomolobus æstivalis*, (Mitch.) Goode & Bean.—*Herring*.

St. John's.

190. *Pomolobus mediocris*, (Mitchill) Gill.—*Hickory Shad*.

St. John's.

191. *Dorosoma Cepedianum*, (Lacépède) Gill.—*Stink Shad*.

St. John's.

CYPRINIDÆ.

192. *Notemigonus americanus*, (Linn.) Jordan.—*Silver-fish*.

193. *Erimyzon Goodei*, Jordan, sp. nov.—"*Goode's Sucker*."

194. Unknown species.

Arlington.

195. Unknown species.

Arlington.

SILURIDÆ.

196. *Ichthæurus punctatus*, (Raf.) Jordan.—*Channel Cat*; *Small-mouth Cat*.

St. John's.

197. *Amiurus erebennus*, Jordan.—"*Goode's Cat-fish*."

St. John's and Arlington River.

198. *Amiurus nigricans*, (Les.) Gill.—*Mud Cat*.

St. John's.

199. *Ælurichthys marinus*, (Mitchill) B. & G.—*Sea Cat-fish*; *Gaff-top-sail*.

St. John's.

200. *Ariopsis felis*, (Linn.) Gill & Jordan.

Coast.

ANGUILLIDÆ.

201. *Anguilla vulgaris*, Turton.

CONGRIDÆ.

202. *Conger oceanica*, (Mitch.) Gill.

ACIPENSERIDÆ.

203. *Acipenser*, sp.
Common in St. John's.

LEPIDOSTEIDÆ.

204. *Lepidosteus osseus*, (Linn.) Ag.—*Gar Pike*.
St. John's.
205. *Lepidosteus platystomus*, Raf.—*Alligator Gar*.
St. John's.

AMIIDÆ.

206. *Amia calva*, Linn.—*Mud-fish*.

CEPHALOPTERIDÆ.

207. *Ceratoptera birostris*, (Walbaum) Goode.—*Devil-fish*.
Coasts.

MYLIOBATIDÆ.

208. *Myliobatis Fremenvillei*, (Les.) Stover.
209. *Rhinoptera quadriloba*, (Le Sueur) Cuvier.—*Clam-cracker*.
St. John's.
210. *Ætobatis narinari*, M. & H.*

TRYGONIDÆ.

211. *Pteroplatea maclura*, Müll. & Henle.—*Sun-fish*.
Indian River.
212. *Trygon sabina*, Le Sueur.—*Stingaree*.
St. John's River.

RAIIDÆ.

213. *Raia Desmarestia*, Le Sueur, (= *R. eglanteria*?).
Described from Florida.

PRISTIDÆ.

214. *Pristis antiquorum*, (Linn.) Lath.

ALOPECHIDÆ.

215. *Alopias vulpes*, (Linn.) Bon.*

SPHYRNIDÆ.

216. *Sphyrna zygaena*, (Linn.) Müll. & Henle.

Indian River.

217. *Reniceps tiburo*, (Linn.) Gill.

GALEORHINIDÆ.

218. *Isogomphodon maculipinnis*, Poey.*

219. *Galeocerdo tigrinus*, Müll. & Henle.*

220. *Eulamia Milberti*, (Müll. & Henle) Gill.

Indian River.

GINGLYMOSTOMATIDÆ.

221. *Ginglymostoma cirratum*, (Gmel.) M. & H.

PETROMYZONTIDÆ.

222. *Petromyzon marinus*, Linn.—*Lamper-eel*.

BRANCHIOSTOMIDÆ.

223. *Branchiostoma lubricum*, Costa.

CATALOGUE OF A COLLECTION OF FISHES SENT FROM PENSACOLA, FLORIDA, AND VICINITY, BY MR. SILAS STEARNS, WITH DESCRIPTIONS OF SIX NEW SPECIES.

By G. BROWN GOODE and TARLETON H. BEAN.

The publication of the following list of fishes, collected by Mr. Stearns in the vicinity of Pensacola, Florida, is a preliminary step to the work of identifying and describing the large collections from the Gulf of Mexico now in the possession of the National Museum.

The fishes enumerated below were obtained in the winters of 1877-8 and 1878-9 by Mr. Stearns in the leisure hours of an active business life. Many of the larger species were forwarded to Washington in ice, and casts of them have been made in plaster. Mr. Stearns has usually sent interesting notes with each specimen, relating to the life-history of the species. We have refrained from publishing these, hoping that he will himself give them to science in a more complete form.

The common names published are those in use at Pensacola. The numbers in parentheses following the Museum catalogue numbers refer to Mr. Stearns's collecting record.

SMITHSONIAN INSTITUTION, Washington, May 27, 1879.

1. MALTHEIDÆ.

1. *Malthe cubifrons* Richardson.

A single specimen, No. 22,833, was sent by Mr. Stearns. The Museum has other specimens from West Florida—Nos. 21,467, 5,768, and 20,485. The radial formula in all is D. 4; A. 4; V. 1, 5; P. 13. No. 21,467 is 12½ inches long, an enormous size for this fish.

2. DIODONTIDÆ.

2. *Chilomycterus geometricus* (Linn.) Kaup.—*Puff-fish*.

Two specimens, No. 21,492 (61), in alcohol, each about 6 inches in length, were sent; also a beach-dried specimen, No. 21,334 (19), somewhat longer. The coloration of the alcoholic specimen is peculiar, and it might at first sight be thought to belong to variety γ as defined by Günther. The ground-color is very dark, but a close examination reveals the irregularly parallel longitudinal lines characteristic of the species in its typical form.

3. TETRODONTIDÆ.

3. *Cirrisomus turgidus* (Mitch.) Jordan & Gilbert.—*Toad-fish*.

A single specimen, No. 21,495 (51), $5\frac{1}{4}$ inches in length.

4. *Lagocephalus lævigatus* (Linn.) Gill.

A single specimen, 19 inches in length, No. 22,807. D. 14; A. 12; P. 16. Caudal deeply forked. Spines 4-rooted. Length of head less than its distance from dorsal, and contained $3\frac{2}{3}$ times in length without caudal.

4. OSTRACIONTIDÆ.

5. *Ostracion quadricornis* Linn.—*Cow-fish*.

A single specimen, No. 21,310.

5. BALISTIDÆ.

6. *Alutera Schœpfii* (Walb.) Goode & Bean.

A specimen, No. 6,068, 16 inches in length, was sent from Cedar Keys, Fla., by Judge Steele, about 1864. D. 32; A. 35; P. 12; C. 12.

7. *Monacanthus occidentalis* Günther.

A bottle, No. 9,686, containing numerous specimens of this species, is labelled "Cedar Key, West Florida," and another, No. 5,868, contains two specimens from Charlotte Harbor, collected by C. B. Baker. This species doubtless occurs at Pensacola.

No. 5,868 (*a*). D. 31; A. 29.

No. 5,868 (*b*). D. 35; A. 32.

Monacanthus spilonotus, described by Cope* from the Gulf of Mexico, should also be looked for in this region.

8. *Balistes capricus* Linn.—*Leather Jacket*.

A fine specimen, No. 21,220 (4), 21 inches in length.

*Trans. Amer. Philos. Soc. 1870, p. 476.

6. HIPPOCAMPIDÆ.

9. *Hippocampus antiquorum* Linn.—*Sea Horse*.

A single specimen was received from Mr. Stearns, No. 21,335 (15). The Museum possesses another, No. 6,933, from Pensacola, received from an unknown contributor.

In No. 6,933, a female, the head is contained $5\frac{1}{2}$ times in total length. There are 12 body rings and 34 caudal rings.

No. 21,335, a female, is a dried specimen in bad order, which appears to agree essentially with No. 6,933. It has 12 body rings and 33 caudal rings, and 19 rays in the dorsal.

7. SYNGNATHIDÆ.

10. *Syngnathus* sp.

A single individual, too young for identification, was sent by Mr. Stearns.

8. SOLEIDÆ.

11. *Achirus lineatus* (Linn.) Cuvier.—“*Flounder*.”

Two specimens were received. These are remarkable in the fact that the ventral surfaces are immaculate, while all specimens of this species from the Eastern and Middle States are strongly maculated with black or brown, except a few from the Potomac River. Others from the Potomac are maculated. How is it with the species on the South Atlantic coast?

No. 21,496 (a). D. 54; A. 43; P. 0; V. 4; C. 16. L. lat. 78.

No. 21,496 (b). D. 58; A. 43; P. 0; V. 4. L. lat. 76.

9. PLEURONECTIDÆ.

12. *Citharichthys spilopterus* Günther.

?? *Citharichthys microstomus* GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 223.

An individual, No. 21,500, from Pensacola, Fla., Silas Stearns, 5 inches in length. D. 78; A. 54; P. 1, 10; C. 17; V. 6. L. lat. 47; L. trans. $\frac{1}{5}$.

No. 18,054, an individual $3\frac{3}{4}$ inches long, was received from mouth of St. John's River, Fla., through Prof. S. F. Baird. D. 81; A. 64; P. 1, 8; C. 17; V. 6. L. lat. 47; L. trans. $\frac{1}{5}$.

Günther's types, from Bahia, Santo Domingo, New Orleans, Jamaica, and West Africa, had the following radial formulae: D. 76-78; A. 60-63; L. lat. 47-50. Gill's type, from Beesley's Point, had the following: D. 81; A. 58; C. 18; P. 10; V. 6. L. lat. 42; L. trans. $\frac{1}{4}$??.

Our specimens agree very satisfactorily with both diagnoses, except in the number of transverse rows of scales, as given by Gill.

13. *Pseudorhombus dentatus* (Linn.) Günther.—*Flounder*.

Two specimens, No. 21,340 (21), were received. That the Flounder of the South cannot be distinguished from the supposed different species

of the North (*Channopsetta ocellaris* and *C. melanogaster* of authors) is very evident to us after examining specimens from Massachusetts, Virginia, South Carolina, East Florida, West Florida, Texas, and Paraguay.

In addition to the tables of measurements given below, we note the following radial formulæ:

No. 21,340 a.	Pensacola.	D. 88; A. 68.
No. 21,340 b.	Pensacola.	D. 89; A. 68.
No. 19,050.	Florida.	D. 85; A. 69.
No. 18,347.	Florida.	D. 85; A. 63.
No. 18,349.	Florida.	D. 92; A. 73.
No. 18,348.	Florida.	D. 87; A. 66.
No. 5,885.	Hog Island, Va.	D. 89; A. 69.

The detailed measurements of eighteen specimens are here inserted.

Table of Measurements.

Current number of specimen	16,315.		16,597.		14,652.		15,177.	
Locality	{ Wood's Holl, Massachusetts.		{ Wood's Holl, Massachusetts.		{ Wood's Holl, Massachusetts.		{ Norfolk, Virginia.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length (without caudal) ..	380	-----	336	-----	421	-----	345	-----
Length to end of middle caudal rays.		-----	404	-----	506	-----	412	-----
Body:								
Greatest height.....		44						42
Height at ventrals.....		30		31½				31
Least height of tail.....		11						10
Length of caudal peduncle (end of dorsal to origin of middle caudal rays).....		10						10
Head:								
Greatest length.....		26						27
Width of interorbital area		3		3		3		3
Length of snout.....		5		5½		5		6
Length of operculum.....		7½						
Length of upper jaw.....		12½		13		13		13
Length of mandible.....		15		16		15½		16
Diameter of orbit.....		4						4
Dorsal:								
Distance from snout.....		6						6
Length of longest ray.....		10½						10
Anal:								
Distance from snout.....		32						32
Length of longest ray.....		10½						10½
Caudal:								
Length of middle rays.....		20				20		19
Length of external rays.....		17						17
Pectoral:								
Distance from snout.....		26						27
Length.....		12½						12½
Ventral:								
Distance from snout.....		25½						25½
Length.....		8						8
Dorsal.....	90		84		89		85	
Anal.....	69		65		69		67	
Pectoral.....	II, 10							
Number of scales in lateral line.....	98							

Table of Measurements—Continued.

Current number of specimen	9,388 b.		19,052.		19,049.		21,273 b.	
Locality	{ Indianola, Texas.		{ St. John's River, Florida.		{ St. John's River, Florida.		{ Florida.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length (without caudal) ..	236	.....	156	.....	170	.....	237	.....
Body:								
Greatest height		44						
Least height of tail		10						
Head:								
Greatest length		26½				28		28
Width of interorbital area		4						
Length of snout		7						
Length of upper jaw		14		13		14½		14
Length of mandible		17		16		17		17
Diameter of orbit		4						
Dorsal:								
Distance from snout		5						
Length of longest ray		11		12		12		
Anal:								
Length of longest ray		12		12½		13		
Caudal:								
Length of middle rays				23				
Dorsal	87	.....	89	.....	85	.....	86	.....
Anal	66	.....	67	.....	68	.....	68	.....

Current number of specimen	9,388.		4,887.		19,476 a.		19,476 b.	
Locality	{ Indianola, Texas.		{ "albigitta," type.		{ Eastern Shore of Virginia.		{ Eastern Shore of Virginia.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length (without caudal) ..	174	.....	123	.....	136	.....	111	.....
Length to end of middle caudal rays.	209	.....	147	.....	166	.....	
Body:								
Greatest height		42		43		44		43
Height at ventrals		30		33		32		
Least height of tail		10		11		11		
Head:								
Greatest length		27		29½		28		27
Width of interorbital area		3		2		3		
Length of snout		6		6		5½		
Length of upper jaw		14		15		13		13
Length of mandible		16		17		15		15
Diameter of orbit		4½		6				
Dorsal:								
Distance from snout		7		7				
Length of longest ray		10½		12		12		12½
Anal:								
Distance from snout		32		33				
Length of longest ray		10		13½		12		13
Caudal:								
Length of middle rays		20		21		22		
Length of external rays		15		17				
Pectoral:								
Distance from snout		27		31				
Length				15				
Ventral:								
Distance from snout		25		28				
Length		8		10				
Dorsal	83	.....	70	.....	88	.....	84	.....
Anal	64	.....	60	.....	68	.....	65	.....

Table of Measurements—Continued.

Current number of specimen	17,121.		17,122.		17,115.	
Locality	{ Charleston, South Carolina.		{ Charleston, South Carolina.		{ Charleston, South Carolina.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length (without caudal)	172	.....	171	.....	188	.....
Head:						
Greatest length.....		26				29½
Length of upper jaw		11½		12½		14
Length of mandible		14½		15		17½
Dorsal:						
Length of longest ray.....		12				
Anal:						
Length of longest ray		13				
Dorsal.....	88				90	
Anal.....	67				70	
Current number of specimen	21,279.		18,048.		8,436.	
Locality	{ St. John's River, Florida.		{ Florida.		{ Paraguay.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length (without caudal)	405	.....	178	.....	256	.....
Length to end of middle caudal rays.....	486	.....	218	.....	315	.....
Body:						
Greatest height.....		46		44		46
Height at ventrals		32		33		31
Least height of tail.....		11		12		12
Length of caudal peduncle (end of dorsal to origin of middle caudal rays)		10		10½		11
Head:						
Greatest length.....		28		27		28
Width of interorbital area.....		4½		2½		2½
Length of snout		6		6		6
Length of operculum		8		7		
Length of upper jaw		13½		12½		13
Length of mandible.....		16½		15		16
Diameter of orbit.....		3½		5½		4½
Dorsal:						
Distance from snout		6½		5		7
Length of longest ray.....		11		11½		11
Anal:						
Distance from snout		33		30		29
Length of longest ray		11½		11		10½
Caudal:						
Length of middle rays		20		22		23
Length of external rays		17½		18		19
Pectoral:						
Distance from snout		27		26		27½
Length		13½		13½		13
Ventral:						
Distance from snout		26½		24½		25
Length		8½		8		8
Dorsal.....	85		79		74	
Anal.....	68		60		57	
Pectoral	II, 10					
Ventral	6					
Number of scales in lateral line.....	101				100	

14. *Pseudorhombus quadrocellatus* (Gill) Jordan.*Ancylosetta quadrocellata* GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 224.

This species was originally described from specimens obtained at Pensacola.

10. BATRACHIDÆ.

15. *Batrachus tau* Linn.—“*Sarpo*”; *Sea Robin*.

A specimen of this species, No. 21,477 (27), corresponds closely in coloration with the southern specimens referred to by Günther.

Other individuals were obtained, which had grown to the size of 12 or 15 inches, and which, if coloration were accepted as a mark of specific rank, would surely be entitled to description as new species. The ground-color is gray or yellowish white, covered with large irregular blotches and small roundish spots of brown. The type of coloration is very different from that described by Günther from southern specimens in the British Museum. A fuller description of these specimens with measurements will be given hereafter.

11. GOBIIDÆ.

16. *Gobius soporator* Cuv. & Val.

A single specimen, No. 22,852, $2\frac{1}{4}$ inches in length, of a species of *Gobius*, was sent by Mr. Stearns. It is so shrivelled up from immersion in too strong alcohol that its characters are not very clearly to be made out. It agrees very well with the descriptions of *Gobius soporator*, and is very like specimens of that species from the Bermudas, except that the fins are blackish, and, unlike the Bermuda specimens, show no spots.

17. *Eleotris gyrinus* Cuv. & Val.

A single specimen, No. 22,853, of an *Eleotris*, agrees essentially with the descriptions of *E. gyrinus* and with specimens sent under this name from Cuba by Professor Poey.

12. TRIGLIDÆ.

18. *Dactylopterus volitans* (Linn.) Lac.

A single specimen, $6\frac{1}{2}$ inches in length, and measuring between the tips of the extended fins $8\frac{1}{2}$ inches. D. 1, IV, 1, 8; A. 6; P. 6, 22; V. 7; C. 5, 4.

In the young, the proportional length of the preopercular spines is greater than in the adult, equalling the greatest width of the head. The scales upon the flanks are conspicuously carinate, in the first and fourth rows from the abdominal flat surface showing a tendency to form strong ridges upon the sides of the body. The first and second rays of the first dorsal are separated from the other rays of this fin, and when the fin is closed and resting in the dorsal groove the first ray falls back upon the dorsal surface upon the right-hand side, the second upon the left embracing the fin. These rays resemble filaments, and it seems probable that they have independent motion, like the filaments of *Lophius*. They are never received into the dorsal groove. The fins are

dark, and show no traces of the circular blue spots often seen in individuals of this species. The colors are dull and little conspicuous.

19. *Prionotus tribulus* Cuv. & Val.

A single individual, No. 22,820, $5\frac{2}{5}$ inches in length. D. X, 12; A. 10; P. 13 + 3; V. I, 5; C. 4 + 11 + 3.

13. POLYNEMIDÆ.

20. *Polynemus octonemus* Girard.

Several specimens of this interesting species were obtained, notes upon which are given below.

No. 22,821 (70). Length $4\frac{1}{5}$ inches. D. II, VI, I, 12; A. II, 12; P. filaments 8; V. I, 5.

No. 22,822 (71). Two specimens, $3\frac{2}{5}$ inches and $3\frac{3}{10}$ inches in length. D. II, VI, I, 12; P. filaments 8; A. II, 12; V. I, 5. L. lat. 62.

No. 22,822. D. II, VI, I, 11; A. II, 13; P. filaments 8; V. I, 5. L. lat. 58.

No. 22,823. Length $4\frac{1}{10}$ inches. D. II, VI, 12; A. II, 13; P. filaments 8; V. I, 5. L. lat. 60.

14. TRICHIURIDÆ.

21. *Trichiurus lepturus* Linn.

Two specimens, No. 22,802 (102), $22\frac{1}{2}$ inches long, and No. 22,817 (112), 20 inches long.

22,802. D. 130; P. 11.

22,817. D. 118; P. 11.

15. SCOMBRIDÆ.

22. *Orcynus alliteratus* (Raf.) Gill.

A single specimen, No. 22,815 (92), 13 inches long, weighing $\frac{3}{4}$ of a pound, was sent by Mr. Stearns.

This specimen is interesting as being the only young individual taken on this side of the Atlantic.

A few irregularly distributed dark spots about the size of the pupil of the eye occur on the sides of the body below the pectoral.

23. *Cybium maculatum* (Mitchill) Cuvier.—*Spanish Mackerel*.

A single specimen, No. 21,333 (35), $14\frac{1}{2}$ inches in length, was sent by Mr. Stearns. There are about fifteen large spots between the branchial opening and the base of the caudal. D. 18 + 17, VII; A. 16, IX; P. 18; V. 6. Teeth, $\frac{16-14}{11-7+}$.

A young specimen, No. 7,310, $9\frac{1}{2}$ inches long, was sent from West Florida by C. B. Baker.

16. CARANGIDÆ.

24. *Decapterus punctatus* (Mitch.) Gill.

A single specimen, No. 22,819, was sent by Mr. Stearns. D. VIII, I, 27+1, 25+1; P. II, 18; V. I, 5. L. lat. 85.

25. *Paratractus pisquetus* (Cuv. & Val.) Gill.—*Hard Tail*.

An individual of 11 inches, No. 21,257, was sent. D. VIII, 25; A. 22; P. 21; V. I, 5. Lateral scales: to curve, 50; in front of curve about 47.

26. *Carangus hippos* (Linn.) Gill.—*Crevallé*.

A magnificent specimen, 30 inches in length.

27. *Trachynotus carolinus* (Linn.) Gill.—*Pompano*.

A large individual, No. 21,309, 15 inches long. D. VI, I, 25; A. II, 22; P. II, 17; V. I, 5.

Also an individual, No. 22,824 (69), $2\frac{3}{5}$ inches in length. D. VI, I, 23; A. II, I, 21; V. I, 5; P. 17.

Also several very minute individuals (Coll. No. 72), not three-quarters of an inch in length.

28. *Trachynotus goreensis* Cuv. & Val.

A skin of this species, obtained in West Florida by Dr. J. W. Velie, has been sent for identification. Mr. Blackford sent another large specimen, No. 22,089, of this species, from Jupiter Inlet, Florida, in January, 1879; weight, 16 pounds; length, 34 inches.

29. *Seriola Stearnsii* Goode & Bean.—*Amber-fish*.

The description of this beautiful new species obtained at Pensacola by Mr. Stearns is given on page 48 of the present volume of the Proceedings of the National Museum.

A single specimen, No. 21,325 (116), has been received.

30. *Seriola bonariensis* Cuv. & Val.—*Rock Salmon*.

A magnificent specimen, No. 22,258, 890 millimetres long, of this species, hitherto known only from the coast of Brazil, was sent by Mr. Stearns. Detailed measurements are given below.

Table of Measurements.

Current number of specimen	22,258.	
	Pensacola, Fla.	
	Millim- tres.	100ths of length.
Extreme length.....	890	
Length to end of middle caudal rays.....	800	
Body:		
Greatest height.....	216	27
Greatest width.....	99	12 $\frac{3}{4}$
Height at ventrals.....	197	24 $\frac{3}{4}$
Least height of tail.....	35	4 $\frac{3}{4}$
Length of caudal peduncle.....	57	7

Table of Measurements—Continued.

Current number of specimen	22,258.	
Locality	Pensacola, Fla.	
	Millime- tres.	100ths of length.
Head:		
Greatest length	199	25
Height at posterior margin of preoperculum	173	21 $\frac{1}{2}$
Height at posterior margin of operculum	190	23 $\frac{1}{2}$
Greatest width	95	12
Width of interorbital area	65	8
Length of snout	65	8
Length of operculum	53	6 $\frac{5}{8}$
Length of upper jaw	80	10
Length of mandible	100	12 $\frac{1}{2}$
Distance from snout to orbit	80	10
Diameter of orbit	35	4 $\frac{3}{8}$
Dorsal (spinous):		
Distance from snout	274	34
Length of base	77	9 $\frac{5}{8}$
Length of first spine	14	1 $\frac{3}{4}$
Length of second spine	22	2 $\frac{3}{4}$
Length of third spine	32	4
Length of fourth spine	33	4
Length of fifth spine	18	2 $\frac{1}{4}$
Length of sixth spine	13	1 $\frac{1}{2}$
Length of seventh spine	5	$\frac{5}{8}$
Dorsal (soft):		
Length of base	335	42
Length of antecedent spine	45	5 $\frac{5}{8}$
Length of first ray	128	16
Length of longest ray	140	17 $\frac{1}{2}$
Length of last ray	49	6
Anal:		
Distance from snout	450	56 $\frac{1}{2}$
Length of base	229	28 $\frac{3}{8}$
Length of first spine	3	$\frac{3}{8}$
Length of second spine	6	$\frac{3}{4}$
Length of third spine	27	3 $\frac{3}{8}$
Length of first ray	105	13
Length of longest ray		
Length of last ray	45	5 $\frac{5}{8}$
Caudal:		
Length of middle rays	35	4 $\frac{3}{8}$
Length of external rays	150	18 $\frac{3}{4}$
Pectoral:		
Distance from snout	209	26
Length	106	13 $\frac{1}{2}$
Ventral:		
Distance from snout	235	29 $\frac{3}{8}$
Length	120	15
Branchiostegals	VII	.....
Dorsal	VII, I, 29	.....
Anal	II, I, 21	.....
Pectoral	I, I, 20	.....
Ventral	I, 5	.....
Number of scales in lateral line	ca. 131	.....
Number of transverse rows above lateral line	ca. 22	.....
Number of transverse rows below lateral line	ca. 36	.....

31. *Elagatis pinnulatus* Poey.*Seriola pinnulata* POEY, Mem. Hist. Nat. Cuba, II, p. 233.*Decapterus pinnulatus* POEY, op. cit. p. 374.*Elagatis pinnulatus* POEY, Rep. Fis. Nat. Cuba, II, 1868, p. 378.

Several specimens of this species were obtained by Mr. Würdemann in West Florida.

17. STROMATEIDÆ.

32. *Peprilus alepidotus* (Linn.) Cuvier.—*Moon-fish*.

A single specimen, No. 21,475 (9), 7 $\frac{1}{2}$ inches in length. D. IV, 42; A. IV, 42; P. 19.

18. LATILIDÆ.

33. *Caulolatilus microps* Goode & Bean.

The Smithsonian Institution received, March 22, 1878, this fish from Mr. Stearns. It was taken March 18, 1878, on the Snapper Bank, off Pensacola, in 35 fathoms of water. It is now a fine alcoholic specimen, No. 20,971 of the Fish Catalogue.

Caulolatilus microps is related to the Brazilian form *Caulolatilus chrysops* (Cuvier and Valenciennes) Gill, and the Cuban form *Caulolatilus cyanops* Poey, described in 1867.* Of the former, two specimens only are recorded: one, the type of the original description, one foot long, collected on the coast of Brazil by M. Gay, and probably now in the museum in Paris; a second, in the British Museum, a stuffed specimen, purporting to have been collected in the West Indies. Of Poey's *C. cyanops*, the National Museum possesses a fine specimen (Cat. No. 4,750), 15 inches long, collected and presented by Professor Poey.

The Pensacola specimen is 2 feet and 3 inches long, weighing 9½ pounds. Its color has faded, but a yellow blotch is still visible under the eye, similar to that mentioned in *C. chrysops*. A dark blotch is visible in and above the axilla of the pectoral.

For diagnosis see Proceedings U. S. National Museum, I, 1879, p. 43.

19. SCIÆNIDÆ.

34. *Cynoscion carolinensis* (Cuv. & Val.) Gill.—*Spotted Trout*.

A single specimen, No. 22,811 (100), 12½ inches in length. D. IX, 24; A. I, 9; P. 16; V. I, 5; C. 9+8. L. lat. ca. 88.

35. *Cynoscion nothus* (Holbrook) Gill.—*White Trout*.

A single individual, No. 21,480 (60), 9½ inches long. D. X, 27; A. II, 11; P. 16; V. I, 5; C. 1+9+8+2. L. lat. 57.

36. *Pogonias cromis* (Linn.) Cuvier.—*Drum*.

An individual, No. 22,806, 20¼ inches long, weighing 4¼ pounds. D. X, I, 21; A. II, 6; P. 18; V. I, 5; C. 19. L. lat. 48; L. trans. 6, 15.

37. *Liostomus philadelphicus* (Linn.) Goode.—*Spot*; *Chopa Blanca*.

Perca philadelphica LINNÆUS, Syst. Nat. ed. x, 1758, i, p. 291; ed. xii, 1766, i, p. 484.

Liostomus philadelphicus GOODE, Fishes of East Florida (*vide supra*).

Liostomus obliquus DEKAY, and subsequent authors.

A single specimen, No. 21,478 (38), 6½ inches. D. X, I, 29; A. II, 12; P. 19; V. I, 5; C. 9+8. Transverse rows of scales about 54.

38. *Bairdiella argyroleuca* (Mitchill) Gill.—*Mademoiselle*.

A specimen, No. 21,499 (25), 7½ inches long. D. XI, 19½; A. II, 8½; P. 15; V. I, 5; C. 9+8. L. lat. 50; L. trans. ⅞.

A young individual, No. 22,849, 4½ inches in length. D. XI, I, 21; A. II, 9. L. lat. 49; L. trans. ⅞.

* Repertorio Físico-Natural de la Isla de Cuba, i, p. 312.

39. *Sciænops ocellatus* (Linn.) Gill.—Red Horse; Channel Bass.

A single specimen, No. 21,774, 15½ inches long. D. X, I, 24; A. II, 7; P. II, 14; V. I, 5; C. 17. L. lat. 46; L. trans. $\frac{5}{12}$. Four black spots on the right side; two on the left.

40. *Menticirrus alburnus* (Linn.) Gill.—Whiting.

A single specimen, No. 21,332 (34), 15 inches long, in color silvery white immaculate, with bluish reflections upon back and body, white upon the belly.

In coloration, this specimen agrees with the *Menticirrus littoralis* of Holbrook, but seems to have no definite characters by which it may be distinguished.

D. X, I, 24; A. I, 6½; P. 20; V. 6; C. 17. L. lat. about 60; L. trans. $\frac{10}{18}$.

Another specimen, No. 22,832, 9½ inches long, agrees in proportions with the above. Its color is, however, very dusky, and the cloudings are blackish.

D. IX, I, 24; A. I, 7; P. 19; V. I, 5. L. lat. 70; L. trans. $\frac{11}{18}$.

41. *Micropogon undulatus* (Linn.) Cuv. & Val.—Croaker.

A single specimen, No. 21,479 (37), about 5 inches long. D. IX, I, 28; A. II, 7½; P. 18; V. I, 5; C. 9 + 8. L. lat. 72 or 73; L. trans. $\frac{10}{18}$.

20. GERRIDÆ.

42. *Eucinostomus harengulus* sp. nov. Goode & Bean.

There are in the collection two specimens of an undescribed *Eucinostomus* collected in West Florida by Kaiser and Martin. The catalogue number of the specimens is 5145. The largest is 120 millimetres in length to the origin of the middle caudal rays; the smaller, 87 millimetres. The species may be briefly characterized as follows: D. IX, 10; A. III, 7; P. 15; V. I, 5; C. + 17+. L. lat. 44; L. trans. $\frac{5}{10}$.

The height of the body is contained 3 to 3½ times in the total length without caudal; the length of the head, 3⅓ to 3½ times; the diameter of the eye exceeds the length of the snout, and is contained 3 times in the length of the head, and equals the width of the interorbital space. The groove for the processes of the intermaxillaries is naked, and extends to the vertical through the anterior third of the eye. The free portion of the tail is longer than high. The least height of tail equals the length of the 6th dorsal spine. The 3d dorsal spine is the longest, its length being contained twice in the height of the body, and equals the length of the head without the postorbital portion; the last dorsal spine equals in length the 2d anal, and about equals the length of the snout, and is about $\frac{2}{5}$ as long as the 3d. The 1st dorsal ray is fully 1½ times as long as the 1st dorsal spine. The 2d anal spine is stronger and shorter than the 3d, its length being contained 3⅔ times in the length of the head. The 3d anal spine is contained 3½ times in the length of the head. The caudal is forked, its length slightly less

than the length of the head, and very little greater than the length of the pectoral. The pectoral reaches to the perpendicular through the origin of the soft dorsal. The ventral is half as long as the head. The vent is under the 2d ray of the soft dorsal.

21. SPARIDÆ.

43. *Lagodon rhomboides* (Linn.) Holbrook.

This species evidently breeds in the vicinity of Pensacola, as well as many other points on the Southern coast. Young specimens, No. 21,488, ranging from 2 to 4 inches in length, were received from Mr. Stearns.

The Museum has also specimens, No. 3,112, collected at Charlotte Harbor, West Florida, by C. B. Baker.

No. 21,344. D. XII, 11; A. III, 10; P. 16; V. I, 5; C. 17. L. lat. 60°; L. trans. $\frac{9}{18}$.

44. *Archosargus probatocephalus* (Walbaum) Gill.—*Sheep's-head*.

A single specimen, No. 22,803, $13\frac{2}{5}$ inches long. D. XI, $11\frac{1}{2}$; A. III, $8\frac{1}{2}$; P. 16; V. I, 5; C. 9 + 8. L. lat. 43; L. trans. $\frac{9}{18}$.

45. *Pagrus argenteus* Schneider.—*Porgy*.

Pagrus vulgaris CUVIER & VALENCIENNES, Hist. Nat. Poiss. vi, p. 142, pl. cxlvii.—GÜNTHER, Cat. Fish. Brit. Mus. i, p. 466.

We have examined several specimens of a species of *Pagrus* obtained at Charleston, S. C., in April, 1878, by Mr. Goode, and also a specimen, No. 21,339, sent from Pensacola by Mr. Stearns. We are unable to discover any differences between this species and *P. argenteus* of Europe, and provisionally identify them with it. The discovery of this European form in the Western Atlantic is particularly interesting.

Table of Measurements.

Current number of specimen	21,339.		20,981 a, ♀.		20,981 b.	
Locality	Pensacola, Fla. {		Charleston, S. C., G. Brown Goode.		Charleston, S. C., G. Brown Goode.	
	Millime- tres.	100ths of length.	Millime- tres.	100ths of length.	Millime- tres.	100ths of length.
Extreme length	435	.....	398	.....	473	.....
Length to origin of middle caudal rays	346	.....	317	.....	381	.....
Body:						
Greatest height		37 $\frac{1}{2}$		38		36
Greatest width		15 $\frac{1}{2}$		14		13
Height at ventrals		37 $\frac{1}{2}$		38		36
Least height of tail		9 $\frac{1}{2}$		9 $\frac{1}{2}$		9 $\frac{1}{2}$
Length of caudal peduncle		18 $\frac{1}{2}$		19		19 $\frac{1}{2}$
Head:						
Greatest length		33		33		33
Distance from snout to nape		17		17		16
Greatest width		16 $\frac{1}{2}$		15		14 $\frac{3}{4}$
Width of interorbital area		9 $\frac{1}{2}$		9 $\frac{1}{2}$		8 $\frac{1}{2}$
Length of snout		11 $\frac{1}{2}$		12		12
Length of operculum		9		9		9
Length of upper jaw		13 $\frac{1}{2}$		13		13
Length of mandible		14		13 $\frac{1}{2}$		13 $\frac{1}{2}$
Distance from snout to orbit		15 $\frac{1}{2}$		15		15
Long diameter of eye		7 $\frac{1}{2}$		7 $\frac{1}{2}$		7 $\frac{1}{2}$

Table of Measurements—Continued.

Current number of specimen.....	21,339.		20,981 α , ♀.		20,981 b.	
Locality	Pensacola, Fla. {		Charleston, S. C., G. Brown Goode.		Charleston, S. C., G. Brown Goode.	
	Millime- tres.	100ths of length.	Millime- tres.	100ths of length.	Millime- tres.	100ths of length.
Dorsal (spinous):						
Distance from snout		42 $\frac{1}{2}$		43		42
Length of base		31 $\frac{1}{2}$		31 $\frac{1}{2}$		
Length of longest spine		12 $\frac{1}{2}$		12 $\frac{1}{2}$		13
Length of first spine		5 $\frac{1}{2}$		5 $\frac{1}{2}$		6 $\frac{3}{4}$
Length of second spine		7 $\frac{1}{2}$ +		10		
Length of third spine		7 $\frac{1}{2}$		8 $\frac{1}{2}$		8 $\frac{1}{2}$
Dorsal (soft):						
Length of base		19 $\frac{1}{2}$		19 $\frac{1}{2}$		
Length of first ray		8 $\frac{1}{2}$				
Length of longest ray		11		9 $\frac{2}{3}$		10 $\frac{2}{3}$
Length of last ray		11		9 $\frac{2}{3}$		10
Anal:						
Distance from snout		66 $\frac{1}{2}$		64		64 $\frac{1}{2}$
Length of base		19		19		18 $\frac{1}{2}$
Length of first spine		3 $\frac{1}{2}$		4		4
Length of second spine		7 $\frac{1}{2}$		8		8
Length of third spine		7 $\frac{1}{2}$		8 $\frac{1}{2}$		8 $\frac{1}{2}$
Length of first ray		8 $\frac{1}{2}$ +		9+		
Length of longest ray		10				
Length of last ray		10		9		9 $\frac{1}{2}$
Caudal:						
Length of middle rays		12		13		11 $\frac{1}{2}$
Length of external rays		27		28 $\frac{1}{2}$		28
Pectoral:						
Distance from snout		34		34 $\frac{1}{2}$		34 $\frac{1}{2}$
Length		35 $\frac{1}{2}$		34 $\frac{1}{2}$		36+
Ventral:						
Distance from snout		37		38		37
Length		20 $\frac{1}{2}$		19		20
Branchiostegals.....	VI		VI		VI	
Dorsal	XII, 10		XII, 10		XII, 10	
Anal	III, 8		III, 8		III, 8	
Caudal	IV, 15, VI		IV, 15, V		VI, 15, VI	
Pectoral	II, 14		II, 14		II, 14	
Ventral	I, 5		I, 5		I, 5	
Number of scales in lateral line.....	56		56		56	
Number of transverse rows above lateral line	6		7		6	
Number of transverse rows below lateral line						
Air-bladder	13*		14		14	
Number of caecal appendages	4					

46. *Pagellus Milneri* sp. nov. Goode & Bean.

Two specimens of an undescribed species of *Pagellus*, No. 6.134, were sent from Charlotte Harbor, Florida, in 1863, by C. B. Baker. The length of the smaller specimen to the origin of the middle caudal rays is 146^{mm}; of the larger, 156^{mm}. The species is dedicated to our friend Mr. James W. Milner, for eight years Deputy U. S. Commissioner of Fisheries, whose important services to the United States in the department of Fish Culture have been supplemented by much thorough natural history exploration, and who at this time is collecting the fishes of West Florida.

Diagnosis.—The height of the body is 2 $\frac{3}{8}$ in total length, caudal included; 2 $\frac{1}{4}$ in its length without caudal. Length of head 4 $\frac{1}{4}$ times with caudal, 3 $\frac{1}{4}$ without, and equal to length of pectoral. Diameter of eye equals length of operculum; width of interorbital space equals least height of

*To the abdominal outline: there are 16 to the median line of the belly.

tail, which is half the length of the ventral. Diameter of eye in length of head almost 4 times, and less than $1\frac{1}{2}$ times in snout. Preorbital nearly as high as it is long, with maxillary edge nearly straight. There are five series of scales between the preorbital and the angle of the preoperculum. Three series of molars in upper jaw, two in lower. Posterior nostril linear. In life this species is banded vertically with brown. In form of body it resembles the Scuppaug (*Stenotomus argyrops*). Radial formula: B. VI; D. XII, 12; A. III, 10; C. 5 + 8 + 7 + 5; P. I, 14; V. I, 5. L. lat. 47-48; L. trans. $\frac{7}{14}$.

Table of Measurements.

Current number of specimen.....	6,134 a.		6,134 b.	
Locality	Charlotte Harbor, Fla.		Charlotte Harbor, Fla.	
	Millimetres.	100ths of length.	Millimetres.	100ths of length.
Length to origin of middle caudal rays.....	146		156	
Body:				
Greatest height (at ventrals).....		45 $\frac{1}{2}$		46
Least height of tail		10		10
Head:				
Greatest length.....		31		31
Width of interorbital area		10		10
Length of snout		11 $\frac{1}{2}$		11 $\frac{1}{2}$
Length of operculum.....		8		8
Length of upper jaw		12		12
Length of mandible		13		13
Distance from snout to orbit.....		17 $\frac{1}{2}$		17
Diameter of orbit		8		8
Dorsal (spinous):				
Distance from snout		46		46
Length of base		34		33
Length of first spine		4 $\frac{1}{2}$		4 $\frac{1}{2}$
Length of second spine.....		Broken.		Broken.
Length of third spine		11		10+
Length of fourth spine		11		12
Length of fifth spine				12
Dorsal (soft):				
Length of base		20		20
Length of first ray		0		Broken.
Length of longest ray		0		Broken.
Length of last ray		7		Broken.
Anal:				
Distance from snout		67		65
Length of base		22		22
Length of first spine		4 $\frac{1}{2}$		4
Length of second spine.....		7 $\frac{1}{2}$		7
Length of third spine		7+		8
Length of first ray (longest).....		8 $\frac{1}{2}$		Broken.
Length of last ray		7		Broken.
Caudal:				
Length of middle rays		13		12 $\frac{1}{4}$
Length of external rays		29		32
{ superior				
{ inferior		28		30
Pectoral:				
Distance from snout		32		31
Length		31		31
Ventral:				
Distance from snout		39		37
Length		20		20 $\frac{1}{2}$
Length of axillary appendage.....		10		10
Branchiostegals.....	VI		VI	
Dorsal	XII, 12		XII, 12	
Anal	III, 10		III, 10	
Caudal	V+8+7+V		VI+8+7+V	
Pectoral	I, 14		I, 14	
Ventral	I, 5		I, 5	
Number of scales in lateral line.....	48		47	
Number of transverse rows above lateral line.....	7		7	
Number of transverse rows below lateral line.....	14		14	

22. PRISTIPOMATIDÆ.

47. *Pristipoma fulvomaculatum* (Mitch.) Günther.—*Pig-fish*.

A single specimen, No. 21,490, $8\frac{3}{4}$ inches in length. D. XII, $15\frac{1}{2}$; A. III, $11\frac{1}{2}$; P. 18; V. I, 5; C. 9 + 8. L. lat. 55 or 56; L. trans. $\frac{11}{20}$.

Another specimen, No. 3,113, was sent from Charlotte Harbor in 1864 by C. B. Baker. D. XII, 16; A. III, 13; P. 19; V. I, 5; C. 9 + 9. L. lat. 54; L. trans. $\frac{11}{20}$.

48. *Rhomboplites aurorubens* (Cuv. & Val.) Gill.—*Bastard Snapper*.

Several specimens of this beautiful species were obtained in Charleston, S. C., in the spring of 1878. They are often brought to Charleston market, where they are called "Mangrove Snappers." They are obtained chiefly from the Savannah Bank.

Another specimen, No. 21,338 (42), $15\frac{1}{2}$ inches long, was subsequently sent from Pensacola by Mr. Stearns. D. XII, 11; A. III, 8; P. I, 16; V. I, 5; C. 9 + 8. L. lat. 52; L. trans. $\frac{9}{20}$.

Table of Measurements.

Current number of specimen	21,224 a.		21,224 b.		21,338.	
Locality	{ Savannah Bank, Charleston, S. C.		{ Savannah Bank, Charleston, S. C.		{ Pensacola, Fla.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length to origin of middle caudal rays	340	.....	360	.....	306	.....
Length to end of middle caudal rays	393	.....	412	.....	393	.....
Body:						
Greatest height		32.5		33.2		32
Greatest width		14.5		15.0		12.5
Height at ventrals		32.0		32.6		30
Least height of tail		10.5		10.2		10.5
Length of caudal peduncle		17.2		16.5		17
Head:						
Greatest length		31.8		30.8		32
Greatest width		14.0		14.5		14
Width of interorbital area		9.2		9.5		8.5
Length of snout		10.7		10.8		8
Length of operculum .....		.....		.....		11
Length of upper jaw		10.7		10.8		11
Length of mandible		13.7		14.0		13
Distance from snout to centre of orbit		13.7		14.0		12.5
Long diameter of eye		6.7		6.7		7.5
Dorsal (spinous):						
Distance from snout		36.0		36.7		35
Length of base		33.5		34.5		33
Length of first spine .....		.....		4.6		5
Length of second spine		10.0		8.5		9.5
Length of last spine		8.0		7.5		.....
Length of longest spine .....		.....		.....		12.5
Dorsal (soft):						
Length of base		18.5		.....		20
Length of first ray		8.0		7.5		9.5
Length of longest ray		9.8		9.2		9.5
Length of last ray		7.5		7.0		7
Anal:						
Distance from snout		68.0		69.0		68
Length of base		15.3		15.5		14.5
Length of first spine		3.5		3.5		2.6
Length of second spine		7.2		6.8		7
Length of third spine		7.6		8.0		8
Length of first ray		10.7		8.5		10.5
Length of longest ray		10.7		8.5		10.5
Length of last ray		8.2		6.3		7

Table of Measurements—Continued.

Current number of specimen	21,224 a.		21,224 b.		21,338.	
Locality	{ Savannah Bank, Charleston, S. C.		{ Savannah Bank, Charleston, S. C.		{ Pensacola, Fla.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Caudal:						
Length of middle rays		15.2		14.2		16 *
Length of external rays	{ superior	25.0 +		24.2		30
	{ inferior	25.0 +				29.5
Pectoral:						
Distance from snout		29.5		29.5		29
Length		24.2		22.5		26.3
Ventral:						
Distance from snout		35.6		35.8		35.5
Length	{ on left side					19.5
	{ on right side	19.6		19.4		21
Branchiostegals	VII		VII		VII	
Dorsal	XII, 11		XII, 11		XII, 11	
Anal	III, 8		III, 8		III, 8	
Caudal					+ 18 +	
Pectoral	II, 15		II, 16		II, 15	
Ventral	I, 5		I, 5		I, 5	
Number of scales in lateral line	54		55		54	
Number of transverse rows above lateral line	9		9		9	
Number of transverse rows below lateral line	19		20		20	

49. *Lutjanus caxis* (Schneider) Poey.

The Museum has a specimen, No. 5,138, collected in West Florida by Kaiser and Martin. Length 10 inches. D. X, 14; A. III, 8. L. lat. 41.

50. *Lutjanus Stearnsii* Goode & Bean.—*Mangrove Snapper*.

Lutjanus Stearnsii GOODE & BEAN, Proc. U. S. Nat. Mus. i, 1879, p. 179.

A single specimen, No. 21,337, 19 $\frac{3}{4}$ inches, the type of the description of the species.

51. *Lutjanus Blackfordii* Goode & Bean.—*Red Snapper*.

Lutjanus Blackfordii GOODE & BEAN, Proc. U. S. Nat. Mus. i, 1879, p. 176.

A fine specimen, No. 21,330, 26 inches long, was sent from Pensacola by Mr. Stearns in May, 1878, which served as one of the types for the description of the species.

A young individual, No. 21,463, was also sent, which shows some interesting variations from the adult, as indicated in the following table of measurements.

The principal characters of the young as varying from the adult are (1) the greater length of the head, (2) the lesser length of the snout, (3) the greater diameter of the eyes, (4) the greater length of the paired fins, (5) the greater height of the azygos fins, (6) the stouter proportions of the caudal.

Table of Measurements.

Current number of specimen	21,463.	
Locality	Pensacola, Fla.	
	Millime- tres.	100ths of length.
Extreme length.....	241	.....
Length to origin of middle caudal rays	185	.....
Body:		
Height at ventrals		41½
Least height of tail.....		13
Head:		
Greatest length.....		41
Greatest width		15
Width of interorbital area		7½
Length of snout		12½
Length of operculum		13½
Length of upper jaw		15
Length of mandible		19
Distance from snout to orbit.....		14½
Diameter of orbit		9
Dorsal (spinous):		
Distance from snout		44½
Length of base		29½
Length of first spine		5½
Length of second spine		10½
Length of fourth or longest spine		15
Length of last spine		10½
Dorsal (soft):		
Length of base		22
Length of first ray		12
Length of longest ray		16
Length of last ray		9
Anal:		
Distance from snout		71
Length of base		16
Length of first spine		5½
Length of second spine		10½
Length of third spine		11½
Length of first ray		15
Length of longest ray		19
Length of last ray		8½
Caudal:		
Length of middle rays		21
Length of external rays		32
Pectoral:		
Distance from snout		36
Length		34
Ventral:		
Distance from snout		40
Length		25
Branchiostegals	VII	.....
Dorsal	X, 14	.....
Anal	III, 9	.....
Caudal	+17+	.....
Pectoral	II, 15	.....
Ventral	I, 5	.....
Number of scales in lateral line	50	.....
Number of transverse rows above lateral line	8	.....
Number of transverse rows below lateral line	16	.....

23. CENTRARCHIDÆ.

52. *Micropterus pallidus* (Rafinesque) Gill & Jordan.—*Black Bass*.

According to Mr. Stearns this species enters the brackish and salt waters of the Gulf of Mexico, whence he sends a specimen, No. 21,311, 12 inches in length. D. IX, I, 13; A. III, 10; P. II, 12; V. I, 5; C. + 17+. L. lat. 65; L. trans. $\frac{7}{13}$

53. *Lepiopomus incisor* (Cuv. & Val.).—*Brim.*

Lepiopomus pallidus (not Mitchell) GILL & JORDAN, *Annals N. Y. Lyc. Nat. Hist.* ix, 1877, p. 316.

A single individual, No. 21,471 (50), $8\frac{1}{2}$ inches in length. D. X, 12; A. III, 11; P. I, 12; V. I, 5; C. III, 9. L. lat. 44; L. trans. $\frac{7}{16}$.

The description of *Bodianus pallidus* as given by Mitchell does not appear to us to apply to this species, and we cannot believe that our friend Prof. Jordan had the book before him when he made his final decision in the matter. Indeed, this is quite evident from the fact that he habitually quotes it in synonymy as *Labrus pallidus* Mitchell. It seems to us quite evident that Mitchell's species was *Bairdiella argyroleuca* (= *B. punctata* Gill), as was long ago demonstrated by Prof. Gill. It was a whitish, elongated fish, with "holes under the chin," yellow fins, 23 rays in the second dorsal fin, and 2 (not 3) spines in the anal. See Transactions of the Literary and Philosophical Society of New York, I, 1875, p. 420.

54. *Eupomotis speciosus* (Holbrook) Jordan?

A species represented by a single specimen, distinguished from the *Eupomotis speciosus* of the St. John's River solely by its slenderer body, slightly larger eyes, and the presence of only 9 dorsal spines. The markings are very similar to those of *Eupomotis speciosus*. The characters separating *E. speciosus* from *E. pallidus* appear to us of doubtful weight.

24. SERRANIDÆ.

55. *Epinephelus morio* (Cuv. & Val.) Gill.

A single specimen, No. 22,814 (75), 22 inches in length. D. XI, 17; A. III, 8; P. 17; V. I, 5; C. 16. L. lat. ca. 106.

56. *Epinephelus Drummond-Hayi* Goode & Bean.—*Hind.*

Epinephelus Drummond-Hayi GOODE & BEAN, *Proc. U. S. Nat. Mus.* i, 1879, p. 173.

A single specimen, No. 21,255, $16\frac{3}{4}$ inches in length, was received from Mr. Stearns, May, 1878, and was taken as one of the types of the description of the species. D. XI, 16; A. III, 9; C. 14; P. 16; V. I, 5; B. VII. L. lat. 125; L. trans. $\frac{3}{5}\frac{2}{7}$.

The species occurs also in the waters of the Bermudas and South Florida.

57. *Epinephelus nigritus* (Holbrook) Gill.—*Jaw-fish.*

A specimen, No. 21,329, measuring 29 inches in length, and weighing 16 pounds, was received from Mr. Stearns in May, 1878. For full description and measurements see Proceedings U. S. National Museum, I, 1879, p. 182. D. X, 15; A. III, 9; C. 17; P. II, 16; V. I, 5; B. VII. L. lat. 115; L. trans. $\frac{2}{5}\frac{4}{2}$.

58. *Trisotropis falcatus* Poey.—Scamp.

The United States National Museum received, March 24, 1879, from Mr. Silas Stearns, of Pensacola, Fla., a fresh individual, No. 22,236, of a species of *Trisotropis*, called "Scamp" by the fishermen. The weight of the fish is $7\frac{1}{2}$ pounds.

Mr. Stearns's collecting number is 117. He states that it was captured in deep water, and is abundant "in spots." He has seen individuals three times as large as the present one.

Diagnosis.—A *Trisotropis* with the body moderately compressed, its greatest depth nearly equal to $\frac{1}{3}$ of its length without caudal, and exactly equal to twice the length of the pectoral; the length of the head equal to $\frac{2}{3}$ of the greatest depth of body, and to 4 times the length of the snout; the lower jaw projecting beyond the upper for a distance which equals $\frac{1}{3}$ of the long diameter of the eye; the 11th ray of the soft dorsal, the 5th and 6th rays of the anal, the external and 5 of the internal caudal rays produced; the vent in the vertical from the 10th dorsal spine; the pectoral reaching the vertical let fall from the 7th dorsal spine; the ventrals as long as the pectorals, and reaching to the vertical let fall from the 8th dorsal spine; the maxilla extending to and the mandible beyond the vertical through the posterior margin of the orbit; the distance of the eye from the upper profile of the head equal to $\frac{1}{3}$ of its short diameter; the long diameter of the eye contained twice in the length of the snout, and $9\frac{1}{2}$ times in the length of the head; the 6th dorsal spine longest, and equal to the distance from the border of the preoperculum to the end of the opercular flap; the 1st dorsal spine $\frac{2}{3}$ as long as the last and half as long as the 3d and 4th; the longest (11th) ray of the soft dorsal equal to the 1st ray of the anal; the longest (5th) anal ray slightly exceeding the length of the pectoral and ventral; 3 rays in the upper half, and 2 in the lower half of the caudal produced, the longest of these extending beyond the general outline of the rays for a distance equal to the 3d anal spine; the external caudal rays nearly twice as long as the middle rays; the 1st dorsal consisting of 11 spines, the 2d dorsal of 17 rays; the anal having 3 spines and 11 rays; the caudal, about 20 rays; the pectoral, 1 undivided ray; the ventral, 1 spine and 5 rays; the number of rows of scales between the upper angle of the operculum and the origin of the middle caudal rays 120; about 25 scales in a transverse series from the beginning of the spinous dorsal to the lateral line, and about 43 from thence to the lower profile of the body; the posterior nostril three times as long and twice as wide as the anterior, and scarcely its own length from the eye; the 3 opercular spines broad, flat and cleft at the free ends.

Teeth: Vomerines brush-like, in an angular patch; palatines similar and in a single series; intermaxillary teeth in a single series, with a short band at the symphysis; 4 canines; mandibular teeth in two series; several canines at the symphysis.

Table of Measurements.

Current number of specimen.....	22,326 (117).	
Locality.....	Pensacola, Fla.	
	Millime- tres.	100ths of length.
Extreme length.....	694	
Length to origin of middle caudal rays.....	539	
Body:		
Greatest height.....		32
Greatest width.....		14½
Height at ventrals.....		32
Least height of tail.....		11
Length of caudal peduncle.....		14
Head:		
Greatest length.....		36
Greatest width.....		14½
Width of interorbital area.....		7½
Length of snout.....		9
Length of operculum.....		12
Length of upper jaw.....		16½
Length of mandible.....		20
Distance from snout to orbit.....		10
Diameter of orbit.....		4½
Dorsal (spinous):		
Distance from snout.....		36½
Length of base.....		30
Length of first spine.....		5½
Length of second spine.....		10
Length of third spine.....		11
Length of fourth spine.....		11
Length of fifth spine.....		12
Length of sixth spine.....		11½
Length of seventh spine.....		10
Length of eighth spine.....		10
Length of ninth spine.....		Broken.
Length of tenth spine.....		Broken.
Length of eleventh spine.....		7½
Dorsal (soft):		
Length of base.....		25
Length of first ray.....		9½
Length of longest ray (eleventh).....		13½
Length of last ray.....		6
Anal:		
Distance from snout.....		65
Length of base.....		19½
Length of first spine.....		3
Length of second spine.....		6
Length of third spine.....		8½
Length of first ray.....		13
Length of longest ray (fifth).....		17
Length of last ray.....		6½
Caudal:		
Length of middle rays.....		17
Length of external rays.....		30
Pectoral:		
Distance from snout.....		32
Length.....		16
Ventral:		
Distance from snout.....		36
Length.....		16
Vent:		
Distance from snout.....		60
Distance from anal.....		5½
Branchiostegals.....	VII	
Dorsal.....	XI, 17	
Anal.....	II, 11	
Caudal.....	20	
Pectoral.....	I, 16	
Ventral.....	I, 5	
Number of scales in lateral line.....	120	
Number of transverse rows above lateral line.....	ca. 25	
Number of transverse rows below lateral line.....	ca. 43	

59. *Trisotropis microlepis* sp. nov. Goode & Bean.

Two individuals of an apparently undescribed species of *Trisotropis* were collected in West Florida in 1864 by Messrs. Kaiser and Martin.

They are closely related to that group of fishes known in Cuba by the common name "Abadejo" ("Codfish"), and represented by Poey's species *Trisotropis interstitialis* and *T. dimidiatus*. With the description of the former,* it corresponds except in the greater length of the head and the much greater number of the scales.

Diagnosis.—The length of the head is contained $2\frac{1}{2}$ to $2\frac{2}{3}$ times in the length to origin of middle caudal rays. Eye contained 6 to $6\frac{1}{2}$ times in the head. The maxilla extends to the perpendicular through posterior margin of orbit; upper jaw equals length of anal base; it is contained $2\frac{1}{4}$ times in the length of the head. The mandible extends beyond the perpendicular through the posterior margin of the orbit, and is slightly more than one-half the length of the head. Each jaw has two canines. The intermaxillaries have an inner band of villiform and an outer series of large, slender, conical teeth curved inward. At the symphysis are some long slender teeth pointing backwards and movable. The lower jaw has two series of slender conical teeth, the inner being the larger and movable. The head of the vomer is supplied with very small villiform teeth. A narrow band of similar teeth on the palatines. Preoperculum finely denticulated on its posterior margin and with coarser denticulations at the angle. The length of the intermaxillary is contained 3 times in that of the lower jaw. Pectoral extends to the 9th spine of 1st dorsal and the ventral as far. The distance from the ventral to the vent slightly exceeds that from the vent to the origin of the anal. The length of the 1st dorsal spine is slightly more than that of the 2d; the 3d and 4th are the longest; the last dorsal spine is slightly longer than the one preceding it. The 1st anal spine is about $\frac{1}{3}$ as long as the last, which is more slender and longer than the 2d. The tail seems to be truncate. The height of the body is contained $3\frac{1}{2}$ times in the length to the origin of the middle caudal rays.

Table of Measurements.

Current number of specimen.....	5,137 a.		5,137 b.	
	West Florida.		West Florida.	
Locality				
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme-length	355			
Length to origin of middle caudal rays.....	294		260	
Body:				
Greatest height (at ventrals).....		20 $\frac{1}{2}$		28 $\frac{1}{2}$
Least height of tail		10 $\frac{1}{2}$		10 $\frac{1}{2}$
Head:				
Greatest length.....		40		38
Greatest width.....		13		12
Width of interorbital area		6		6
Length of snout.....		8 $\frac{1}{2}$		8
Length of operculum		13 $\frac{1}{2}$		12 $\frac{1}{2}$
Length of upper jaw		18		17
Length of mandible.....		20 $\frac{1}{2}$		20 $\frac{1}{2}$
Distance from snout to orbit		10		9 $\frac{1}{2}$
Diameter of orbit		6		6 $\frac{1}{2}$
Nostril (posterior) from eye.....		2		1 $\frac{1}{2}$

* Mem. Nat. Cuba, ii, 1868, p. 127, pl. xiii, fig. 7.

Table of Measurements—Continued.

Current number of specimen	5,137 a.		5,137 b.	
	West Florida.		West Florida.	
Locality	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Dorsal (spinous):				
Distance from snout		37		37½
Length of base		26		27½
Length of first spine		5½		6
Length of second spine		10		10
Length of third spine		10½		10½
Length of last spine		8½		8½
Dorsal (soft):				
Length of base		24		23
Length of longest ray		13		13½
Length of last ray		6½		7½
Anal:				
Distance from snout		67		66½
Length of base		17		18
Length of first spine		2½		3
Length of second spine		6½		6½
Length of third spine		8		9
Length of first ray		14		14
Length of longest ray		16		15
Length of last ray		8		7
Caudal:				
Length of middle rays		20½		
Length of external rays		23+		
Pectoral:				
Distance from snout		36		35
Length		19		18
Ventral:				
Distance from snout		38		36
Length		16½		17
Vent from anal		6		6
Branchiostegals	VII		VII	
Dorsal	XI, 18		XI, 18	
Anal	III, 10		III, 11	
Caudal	+17+		+17+	
Pectoral	I, 16		I, 16	
Ventral	1, 5		1, 5	
Number of scales in lateral line	145		143	
Number of transverse rows above lateral line	30			
Number of transverse rows below lateral line	60			

60. *Trisotropis brunneus* Poey.—Black Grouper.

A single species of the genus *Trisotropis* is given in Professor Gill's Catalogue of the Fishes of the East Coast of North America (p. 28), the *Trisotropis acutirostris* (Cuvier & Valenciennes) Gill. Since there is no specimen of this species in the National Museum, and no record of the occurrence of this species on our coast, we challenge its right to a place among the fishes of our east coast. It was described from the coast of Brazil and has not been satisfactorily identified since its first description, which was very inadequately written.

In Mr. Goode's "Catalogue of the Fishes of the Bermudas," the Bermuda Rock-fish is identified* as *Trisotropis undulosus* (Cuv.) Gill. A more extended study with comparisons shows that this name cannot fairly be retained for any Bermuda species. *T. undulosus* was originally described by Cuvier and Valenciennes from Brazil.† The only distinctive character recorded by those authors is the coloration; all others mentioned apply with equal force to any other member of the genus.

* Bulletin of the U. S. National Museum, No. 5, p. 55.

† Histoire Naturelle des Poissons, ii, 1829, p. 295.

Dr. Günther's characters for *T. undulosus* and Professor Poey's for *T. brunneus* are little better, since no diagnostic points are evident.

Since the Floridan and Cuban faunas are so similar, desiring to avoid a multiplication of specific names, we provisionally refer the Florida specimens before us to Poey's *T. brunneus* until we have an opportunity to compare them with specimens identified by that author. These had been hitherto identified with *T. acutirostris*.

We have studied three specimens, No. 15,462, sent by Mr. Blackford, from New York market, No. 16,902, obtained by Mr. J. H. Richard in Washington market, and No. 21,336 (32), sent by Mr. Stearns from Pensacola in 1878. Full measurements of these specimens are given below.

Table of Measurements.

Current number of specimen.....	21,336.		15,462.		16,902.	
Locality.....	Pensacola, Fla.		Florida?		Florida.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Weight	7 $\frac{3}{4}$ lbs.		10 lbs. in alcohol.			
Extreme length	590		655		495	
Length to end of middle caudal rays	679	(26 $\frac{1}{2}$ in.)	754	(29 $\frac{3}{4}$ in.)	576	
Body:						
Greatest height (behind ventrals)		27 $\frac{1}{2}$		27 $\frac{1}{2}$		27 $\frac{1}{2}$
Height at ventrals		25 $\frac{1}{2}$		26		26
Least height of tail		9		9		10
Head:						
Greatest length		35 $\frac{3}{4}$		37 $\frac{1}{2}$		38
Width of interorbital area		6 $\frac{1}{2}$		6 $\frac{3}{4}$		6 $\frac{1}{2}$
Length of snout		10 $\frac{1}{2}$		10 $\frac{1}{2}$		10
Length of upper jaw		17		17		17 $\frac{1}{2}$
Length of mandible		20 $\frac{1}{2}$		21 $\frac{1}{2}$		21
Distance from snout to centre of orbit		13		13		12 $\frac{1}{2}$
Diameter of eye		4		4		4 $\frac{1}{2}$
Dorsal (spinous):						
Distance from snout		36 $\frac{1}{2}$		36		36
Length of first spine		3 $\frac{3}{4}$				5 $\frac{1}{2}$
Length of longest spine (third)		9				10 $\frac{1}{2}$
Length of last spine		6 $\frac{3}{4}$				7 $\frac{3}{4}$
Dorsal (soft):						
Length of first ray		8 $\frac{1}{2}$		8 $\frac{1}{2}$		9 $\frac{1}{2}$
Length of longest ray		(9th) 10		(9th) 10		(7th) 12
Length of last ray		6		5		6 $\frac{1}{2}$
Anal:						
Distance from snout		68		67		67
Length of first spine		2 $\frac{3}{4}$				3 $\frac{1}{2}$
Length of second spine		4 $\frac{1}{2}$				5 $\frac{1}{2}$
Length of third spine		7		6 $\frac{1}{2}$		7 $\frac{1}{2}$
Length of first ray		10		9		12
Length of longest ray		12		11		13
Length of last ray		6		6		7 $\frac{1}{2}$
Caudal:						
Length of middle rays		15		14 $\frac{2}{3}$		16 $\frac{1}{2}$
Length of external rays		17 $\frac{1}{2}$		17 $\frac{1}{2}$		20 $\frac{1}{2}$
Pectoral:						
Distance from snout		33		32		33
Length		16		15		16 $\frac{1}{2}$
Ventral:						
Distance from snout		35		35		35
Length		13 $\frac{1}{2}$		12 $\frac{1}{2}$		14 $\frac{1}{2}$
Branchiostegals	VII		VII		VII	
Dorsal	XI, 17		XI, 17		XI, 16	
Anal	III, 11		III, 11		III, 10	
Caudal	+ 17 +		+ 17 +		+ 17 +	
Pectoral	I, 16		I, 16		I, 16	
Ventral	I, 5		I, 5		I, 5	
Number of scales in lateral line	130 +		130 +		130	
Number of transverse rows above lateral line	(28)		(28)		27	
Number of transverse rows below lateral line	(60)		(61)		61	

61. *Centropristis atrarius* (Linn.) Barn.—*Sea Bass*.

A young specimen, about 5 inches long, No. 21,483 (47). D. X, $10\frac{1}{2}$; A. III, $6\frac{1}{2}$; P. 16; V. I, 5; C. 9 + 8. L. lat. 51; L. trans. $\frac{5\frac{1}{2}}{18}$.

This specimen and others from Florida show certain characters which, when studied more closely, may serve to separate the southern *Centropristis* from that of New England.

62. *Haliperca subligaria* (Cope) Goode & Bean.

Centropristis subligarius COPE, Proc. Acad. Nat. Sci. Phila. 186-, p. —.

Professor Cope has described, under the name *Centropristis subligarius*, a fish from Pensacola, which we refer provisionally to the genus *Haliperca*. "D. X, 14; A. III, 8. L. lat. 48; L. trans. $\frac{5\frac{1}{2}}{18}$."

25. LABRACIDÆ.

63. *Roccus lineatus* (Bl.) Gill.—*Striped Bass*.

A single specimen, No. 21,312, 17 inches in length. D. IX, 12; A. III, 10; V. I, 5; P. II, 15. L. lat. 66; L. trans. $\frac{1}{4}$.

26. EPHIPPIIDÆ.

64. *Parephippus faber* (Cuv.) Gill.

A single specimen, No. 21,474, $5\frac{2}{10}$ inches long. D. VII, I, 22; A. III, 19; V. I, 5; P. II, 15; C. VI, 15, V. L. lat. 66; L. trans. $\frac{4\frac{6}{10}}{10}$.

27. POMATOMIDÆ.

65. *Pomatomus saltatrix* (Linn.) Gill.—*Blue-fish*.

A specimen, No. 21,777, 19 inches long. D. VII, I, 26; A. I, 27; P. I, 16; V. I, 5; C. 10 + 9. L. lat. 105.

A smaller specimen, No. 21,256, $9\frac{1}{2}$ inches long, was also received.

28. ECHENEIDIDÆ.

66. *Echeneis naucrateoides* Zuiew.—*Sucker*.

A young individual, No. 21,482 (13), 6 inches in length, remarkable from the fact that the tip of the caudal fin is cuneate in outline. The coloration is much the same as in adult individuals of the species, except that the white on the dorsal, anal, and caudal fins is more conspicuous and occupies a wider area. The dorsal and anal fins are essentially white, with the spaces at the base of the fins and between each pair of rays of the same color with the darkest portion of the body. The white areas upon the high anterior portions of the dorsal and anal occupy more than half of the height of these fins. Upon the posterior portion of these fins, the white area is reduced to a marginal line. The white patches on the outer angles of the caudal fin are so arranged that the dark portion of this fin is outlined upon the white in a lanceolate form. The pectoral fins are lightly margined with white posteriorly. D. XXI, 35; A. 33.

29. SPHYRÆNIDÆ.

67. *Sphyræna picuda*.

We have made a preliminary study of the specimens of *Sphyræna* in the National Museum, which has convinced us that the number of scales in the lateral line is very variable, and must be used with caution as a specific character.

We recognize three species on our coast:

1. *Sphyræna picuda*, with comparatively large scales, 81 or more in the lateral line, and the dorsal inserted far in advance of the middle of the body, and in front of the vertical from the tip of the pectoral. We have seen this species from Cuba, the Bermudas, from West Florida (collected by Dr. J. W. Velie), and from South Florida (sent by Mr. E. G. Blackford), a large individual, $37\frac{1}{2}$ inches long.

2. *Sphyræna borealis*. We have examined numerous specimens of young *Sphyrænas* from Wood's Holl, the largest of which do not exceed 9 inches in length. We refer them provisionally to *S. borealis*. These specimens agree quite closely with specimens of *Sphyræna*, from the Mediterranean and the Bermudas, in shape of body, in position of fins, and in coloration. Others from the Canaries and from Europe belong to a totally different species. There are two European species which have been confused by recent writers, and united under the name *S. vulgaris*. We are not at present able to untangle the synonymy.

3. A species which we provisionally refer to *S. guaguancho*, which in the position of the fins resembles *S. picuda*, though the scales are much smaller, 107 to 115 in the lateral line. Besides the Pensacola specimen already mentioned, we have seen this species from Cuba and from Wood's Holl, where a specimen (No. 21,226) nearly 22 inches long was obtained by Vinal N. Edwards, in July, 1876.

68. *Sphyræna guaguancho* Poey.

A single specimen, No. 21,468, 18 inches long.

The height of the body is 7 times in the total length without caudal; length of head $3\frac{1}{8}$ to $3\frac{1}{4}$ times, greatest in young. Diameter of eye contained 6 times in adult, $5\frac{1}{2}$ in young; operculum with two points. Length of pectoral equal to the postorbital portion of the head, $8\frac{1}{2}$ times in total in young, 9 times in adult; its length greater than that of the ventrals, which are contained $3\frac{1}{2}$ in head. Spines of the ventrals almost as long as the rays and $\frac{1}{4}$ as long as the head. Origin of dorsal is far in front of the middle of the body, and in adults slightly, and in the young considerably, in advance of the perpendicular from the tip of the pectoral. The 5th dorsal spine is inserted exactly midway between the tip of the snout and the base of the middle caudal rays. The ventrals inserted in advance of the dorsal. The interspace between the dorsals is contained $5\frac{1}{2}$ to $5\frac{3}{4}$ times in the total without caudal. L. lat. 107 to 112; L. transv. 14 + 17. D. V, I, 9; A. II, 8; P. 16; C. 9 + 8.

The identification of this species was made from one of the types of Prof. Poey's original descriptions now preserved in the National Museum.

Table of Measurements.

Current number of specimen.....	21,226.		21,468.		4,725 a.		4,725 b.	
Locality	{ Wood's Holl, Massachusetts.		Pensacola, Fla.		Cuba.		Cuba.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length.....	541	-----	-----	-----	255	-----	225	-----
Length to origin of middle caudal rays	450	-----	385	-----	275	-----	-----	-----
Body:								
Greatest height.....	17	-----	15	-----	-----	12.2	-----	14.5
Greatest width.....	10	-----	10	-----	-----	-----	-----	-----
Height at ventrals.....	14½	-----	13½	-----	-----	-----	-----	-----
Least height of tail	6½	-----	7½	-----	-----	-----	-----	-----
Length of caudal peduncle.....	21	-----	21	-----	-----	-----	-----	-----
Head:								
Greatest length.....	30½	-----	32	-----	-----	33.7	-----	33.5
Greatest width.....	10	-----	9½	-----	-----	-----	-----	-----
Width of interorbital area.....	5½	-----	5½	-----	-----	5.8	-----	5.5
Length of snout.....	12½	-----	13½	-----	-----	15.5	-----	15.7
Length of operculum.....	4	-----	3½	-----	-----	-----	-----	-----
Length of upper jaw.....	13	-----	13½	-----	-----	14.0	-----	14.0
Length of mandible.....	18½	-----	19	-----	-----	21.0	-----	21.0
Distance from snout to orbit.....	12	-----	13½	-----	-----	-----	-----	-----
Diameter of orbit.....	5	-----	5½	-----	-----	5.8	-----	5.6
Dorsal (spinous):								
Distance from snout.....	41	-----	41	-----	-----	45.0	-----	45.0
Length of base.....	10	-----	9½	-----	-----	9.2	-----	9.2
Length of first spine.....	8½	-----	9½	-----	-----	9.0	-----	10.6
Length of second spine.....	8½	-----	9½	-----	-----	8.0	-----	11.2
Length of last spine.....	4½	-----	5½	-----	-----	5.5	-----	6.0
Dorsal (soft):								
Distance from snout.....	70	-----	69	-----	-----	72.3	-----	71.0
Length of base.....	9½	-----	10	-----	-----	9.2	-----	9.2
Length of antecedent spine.....	4½	-----	5	-----	-----	-----	-----	5.0
Length of first ray.....	-----	-----	10½	-----	-----	10.5	-----	12.0
Length of longest ray.....	-----	-----	10½	-----	-----	10.6	-----	11.7
Length of last ray.....	4½	-----	6	-----	-----	6.5	-----	7.0
Anal:								
Distance from snout.....	71½	-----	72	-----	-----	75.0	-----	74.2
Length of base.....	8	-----	8½	-----	-----	7.8	-----	7.8
Length of first spine.....	1½	-----	1½	-----	-----	-----	-----	2.4
Length of second spine.....	4½	-----	4½	-----	-----	-----	-----	6.0
Length of first ray.....	7+	-----	9½	-----	-----	10.0	-----	11.0
Length of longest ray.....	-----	-----	9½	-----	-----	-----	-----	-----
Length of last ray.....	4½+	-----	6	-----	-----	6.6	-----	6.0
Caudal:								
Length of middle rays.....	7½	-----	7½	-----	-----	7.6½	-----	9.8
Length of exter. { upper.....	21	-----	-----	-----	-----	20½	-----	22.0
{ lower.....	19	-----	-----	-----	-----	20½	-----	20.0+
Pectoral:								
Distance from snout.....	30	-----	30½	-----	-----	33½	-----	33.3
Length.....	10½	-----	11	-----	-----	12	-----	12.2
Ventral:								
Distance from snout.....	38	-----	38	-----	-----	41½	-----	41
Length.....	9	-----	9	-----	-----	9½	-----	10
Branchiostegals.....	VII	-----	VII	-----	-----	-----	-----	-----
Dorsal.....	V, I, 9	-----	V, I, 9	-----	V, I, 9	-----	V, I, 9	-----
Anal.....	II, 8	-----	II, 8	-----	II, 8	-----	II, 8	-----
Caudal.....	IV, 17, IV	-----	-----	-----	-----	-----	-----	-----
Pectoral.....	I, 12	-----	I, 12	-----	I, 12	-----	I, 12	-----
Ventral.....	I, 5	-----	I, 5	-----	I, 5	-----	I, 5	-----
Number of scales in lateral line.....	112	-----	106	-----	115, 120	-----	120	-----
Number of scales in rows above lateral line.....	15	-----	15	-----	18	-----	17 or 18	-----
Number of transverse rows below lateral line.....	17	-----	17	-----	18	-----	18	-----

30. MUGILIDÆ.

69. *Mugil albula* Linn.—*Mullett*.

A single specimen, No. 21,331 (36). D. IV, 8; A. III, 8; P. 16; V. I, 5; C. 7 + 7. L. lat. 42; L. trans. 13.

Several small individuals of this species, No. 21,491, were also received. The largest measured 6 inches in length; those of intermediate size, 4 inches; many others from an inch to an inch and a half.

Bottle No. 5,151 contains several specimens of this species collected in West Florida by Kaiser and Martin.

70. *Mugil brasiliensis* Agassiz.—*Silver Mullet*.

A single specimen, No. 21,498 (28), $11\frac{1}{2}$ inches in length. D. IV, 9; A. III, 8; P. 17; V. I, 5; C. 14. L. lat. 38; L. trans. 12.

31. ATHERINIDÆ.

71. *Chirostoma peninsulæ* sp. nov. Goode & Bean.

Two specimens (Nos. 21,481 *a* and 21,481 *b*) were sent from Pensacola by Mr. Stearns. We also have numerous specimens, No. 21,870, collected in Lake Monroe, Fla., by Prof. Baird.

Diagnosis.—The origin of the anterior dorsal fin is far in advance of the anal fin and slightly in advance of the vent. The height of the body is contained 5 times in total length without caudal (6 times in total length); it is slightly less than the length of the head, and precisely equal to the length of the pectoral. The diameter of the eye is contained 3 to $3\frac{1}{2}$ times in the length of the head; is about equal to the length of the snout and to the width of the interorbital space. Mouth very protractile. Lower jaw long, contained 11 times in length of body without caudal, more than one-third of the length of the head, which is contained in total length of body 4 to $4\frac{1}{3}$ times. Silvery streak occupying the fourth and upper half of the fifth series of scales. Caudal deeply forked; lobes equal. D. V–VI, I, 8–9; A. I, 15–16; C. + 17 +; P. I, 12; V. I, 5. L. lat. 38–39; L. trans. $9\frac{1}{2}$.

72. *Chirostoma vagrans* sp. nov. Goode & Bean.

One specimen of this undescribed species (No. 22,848) was sent from Pensacola by Mr. Stearns, and two (Nos. 22,864 *a* and 22,864 *b*) were sent from Virginia.

Diagnosis.—The origin of the anterior dorsal fin is situated behind a point midway between the origins of the ventral and anal fin and opposite the middle of the interspace between the anal fin and the vent. Height of the body contained $5\frac{1}{2}$ to 6 times in length without caudal, and $6\frac{2}{3}$ in total length, considerably less than length of head and length of pectoral. Diameter of the eye contained 3 times in length of head, greater than length of snout, and less than width of interorbital space. Mouth slightly protractile. Lower jaw contained $15\frac{1}{2}$ times in length

of body without caudal, and equal to diameter of eye, which is one-third the length of the head, which is contained in total length $4\frac{3}{4}$ times. Silvery streak occupying the lower two-thirds of the third and the upper third of the fourth series of scales. Caudal slightly forked; lobes equal. Vertical fins excessively scaly. Scales of body large. D. V, I, 7; A. I, 18; C. + 17 +; P. I, 13; V. I-5. L. lat. 48; L. trans. 7.

The measurements of both species are here given.

Table of Measurements.

Species: *Chirostoma vagrans*.

Current number of specimen.....	22,848.		22,864 a.		22,864 b.	
Locality	Pensacola, Fla.		Virginia.		Virginia.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length			117		101	
Length to origin of middle caudal rays.....	90		100		85	
Body:						
Greatest height		17		17		18
Greatest width.....		10		9		
Height at ventrals		17		17		
Least height of tail		8		8		
Head:						
Greatest length		21		21		21
Greatest width		10 $\frac{1}{2}$		9 $\frac{1}{2}$		10
Width of interorbital area		7 $\frac{1}{2}$		6 $\frac{1}{2}$		7
Length of snout		5		5 $\frac{1}{2}$		
Length of postorbital portion of head.....		9		9		
Length of upper jaw		5 $\frac{1}{2}$		5 $\frac{1}{2}$		
Length of mandible.....		6 $\frac{1}{2}$		6 $\frac{1}{2}$		
Diameter of orbit.....		6 $\frac{1}{2}$		6 $\frac{1}{2}$		6
Dorsal (spinous):						
Distance from snout		60		60		61
Length of longest spine.....		7		6		
Dorsal (soft):						
Distance from snout		76 $\frac{1}{2}$		76		75
Length of base		8		8		8
Length of antecedent spine.....		4		3 $\frac{1}{2}$		4
Length of first ray		9 $\frac{1}{2}$		8 $\frac{1}{2}$		
Length of longest ray.....		9 $\frac{1}{2}$		8 $\frac{1}{2}$		
Length of last ray		6		5 $\frac{1}{2}$		
Anal:						
Distance from snout		64		63		
Length of base.....		22		22		23
Length of first spine		5		4 $\frac{1}{2}$		5
Length of first ray		10+		9 $\frac{1}{2}$		
Length of longest ray.....				9 $\frac{1}{2}$		
Length of last ray				4		
Caudal:						
Length of middle rays		13		12		12
Length of external rays.....				18 $\frac{1}{2}$		20
Pectoral:						
Distance from snout		22		23		
Length		21 $\frac{1}{2}$		20		21
Ventral:						
Distance from snout		44		44		
Length		11		10		10
Branchiostegals.....	VI					
Dorsal	V, I, 7		V, I, 7		V, I, 7	
Anal	I, 18		I, -		I, 18	
Caudal	+17+		+17+		+17+	
Pectoral	I, 13		I, 13		I, 13	
Ventral	I, 5		I, 5		I, 5	
Number of scales in lateral line.....	48		48		48	
Number of transverse rows of scales.....	7		7		7	

Table of Measurements—Continued.

Species: *Chirostoma peninsulae*.

Current number of specimen.....	21,481 a.		21,481 b.	
Locality	Pensacola, Fla.		Pensacola, Fla.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length.....	91	.....	68	.....
Length to origin of middle caudal rays.....	76	.....	56	.....
Body:				
Greatest height.....		19		19
Greatest width.....		10		10½
Height at ventrals.....		18		18
Least height of tail.....		9		8
Head:				
Greatest length.....		24		25
Greatest width.....		11½		11
Width of interorbital area.....		7½		7½
Length of snout.....		6		
Length of postorbital portion of head.....		10		
Length of upper jaw.....		6		
Length of mandible.....		9		
Diameter of orbit.....		7		8
Dorsal (spinous):				
Distance from snout.....		51		
Length of longest spine.....		9		
Dorsal (soft):				
Distance from snout.....		70		
Length of base.....		11		
Length of antecedent spine.....		5		
Length of first ray.....		13		
Length of longest ray.....		13		13
Length of last ray.....		6		
Anal:				
Distance from snout.....		64		
Length of base.....		20		
Length of first spine.....		5½		
Length of first ray.....		13		
Length of longest ray.....		13		14½
Length of last ray.....		7		
Caudal:				
Length of middle rays.....		11		13
Length of external rays.....		21		22
Pectoral:				
Distance from snout.....		24		
Length.....		19		19
Ventral:				
Distance from snout.....		43		
Length.....		12		13
Dorsal.....	V, I, 8	.....	V, I, 9	.....
Anal.....	I, 16	.....	I, 15	.....
Caudal.....	+17+	.....	+17+	.....
Pectoral.....	I, 12	.....	I, 12	.....
Ventral.....	I, 5	.....	I, 5	.....
Number of scales in lateral line.....	38	.....	39	.....
Number of transverse rows of scales.....	9	.....	9	.....

32. BELONIDÆ.

73. *Belone longirostris* (Mitchill) Gill.—Needle-fish.

A single specimen, No. 21,469, 20¾ inches in length. D. 15; A. 18.

A specimen, No. 21,288, from the St. John's River, G. Brown Goode, has the following radial formula: D. 14; A. 18. Others from the same source have, No. 19,076: D. 16; A. 19; and No. 18,441: D. 16; A. 19.

Dr. Günther's statement that the number of dorsal and anal rays in southern specimens is less than in those from the north seems scarcely tenable.

74. *Belone notata* Poey.

Belone notata POEY, Mem. Hist. Nat. Cuba, ii, 1860, p. 293.

A single specimen of this species, not hitherto recorded from the coast of the United States, collected by Kaiser and Martin in West Florida, in 1864 or earlier.

This specimen, No. 5,147, is $15\frac{3}{8}$ inches in length. D. 13; A. 14; P. 11; V. 6; C. 15.

33. CYPRINODONTIDÆ.

75. *Cyprinodon variegatus* Lacépède.—*Minnow*.

Several very large specimens, No. 21,494 (49), were sent from Pensacola by Mr. Stearns.

76. *Mollinesia latipinna* Le Sueur.

The Museum has a bottle, No. 22,845, containing several large specimens of this species from Pensacola, Fla. Donor unknown. The largest specimens measure $3\frac{1}{4}$ inches in length, and one male has a dorsal fin one inch in length.

77. *Fundulus grandis* Baird & Girard.

Fundulus grandis B. & G., Proc. Acad. Nat. Sci. Phila. vi, 1853, p. 389.

An individual, No. 22,847, $5\frac{7}{10}$ inches in length, was sent from Pensacola by Mr. Stearns. D. 13; A. I, 10; V. I, 5; P. II, 16; C. V, 18, V. L. lat. 36; L. trans. 15.

This Cyprinodont corresponds completely with the *Fundulus grandis* of Baird and Girard. Concerning the identity of this species with the *Fundulus heteroclitus* of Linnæus or the *Fundulus pisculentus* of authors we are not prepared to express an opinion.

78. *Hydrargyra similis* Baird & Girard.—*Minnow*.

Hydrargyra similis B. & G., Proc. Acad. Nat. Sci. Phila. 1853, p. 389.

A female, No. 21,484, sent by Mr. Stearns from Pensacola, $5\frac{1}{2}$ inches long, agrees sufficiently well with Baird and Girard's *Hydrargyra similis*. D. 13; A. 11. L. lat 33; L. trans. 13.

A specimen, No. 22,850, D. 12; A. $8\frac{1}{4}$; P. I, 18; V. I, 5.

34. CLUPEIDÆ.

79. *Brevoortia patronus* Goode.—*Alwife*.

Numerous specimens of this species were obtained, the largest of which did not exceed 7 inches in length. Four specimens are included under catalogue No. 21,341; eleven under original No. 93, No. 22,808; six under No. 22,809, original No. 103; seven under No. 22,810, original No. 86. Specimens of this species were sent to the National Museum as early as 1864 by Kaiser and Martin, who collected in West Florida.

80. *Opisthonema thrissa* (Linn.) Gill.

A single specimen, No. 21,462 (63), $5\frac{1}{2}$ inches long. D. 12; A. 28.

81. *Pomolobus chrysochloris* Rafinesque.—"Shad."

One of the most interesting facts brought to notice by this collection is the occurrence in the Gulf of Mexico of this species, hitherto thought to live only in fresh waters.

Three individuals, Nos. 21,778, 21,779, 21,780, were received, December 9, 1878, from the Pensacola Ice Company, the largest $15\frac{1}{2}$ inches in length.

82. *Harengula pensacolæ* sp. nov. Goode & Bean.—*Alcwife*.

The species is by its form most closely associated with *Harengula macrophthalmus*, while in other respects it resembles *Harengula clupecola* and *Harengula humeralis*.

The head is very short, its length contained 4 times in the length of the fish without caudal, and nearly 5 times in its extreme length, to line drawn between the tips of the caudal lobes. In *H. sardina* Poey (= *H. macrophthalmus* Ranz., *fide* Günther), the head is contained $3\frac{1}{2}$ times in body-length; in *H. clupecola* Cuv. & Val. (as identified by Poey), a much more elongate species, $3\frac{1}{2}$ to $3\frac{3}{4}$; in *H. callolepis* sp. nov., Goode, MS., from the Bermudas, $3\frac{1}{2}$ to $3\frac{3}{8}$ times.

The body is high, with projecting belly, the contour resembling that of the Common Shad, *Alosa sapidissima*, its height at the posterior extremity of the operculum being greater than the distance from the tip of the lower jaw to the posterior extremity of the operculum: in the other species it is less, notably so in *H. callolepis*, in which the height at this point barely equals the distance from the tip of the lower jaw to the posterior edge of the preoperculum.

The height of the body is contained in its length (without caudal) $2\frac{3}{4}$ to 3 times (in *H. sardina* 3 times; in *H. clupecola* $3\frac{1}{2}$ times; in *H. callolepis* $3\frac{3}{4}$ to 4 times, being equal to the length of the head).

Scales of the back in front of dorsal with radiating striae and sharply serrated edges, these features being less prominent in the one or two rows on each side next to the dorsal. Other scales smooth, with irregular, but unarmed free margins. When detached they show from three to seven parallel vertical lines, these lines being most numerous posteriorly; upon the nuchal scales these are scarcely present, and they are not visible when attached to the skin, as they are in *H. sardina* (in *H. clupecola* the striations of the nuchal scales are very evident, though the edges are not armed, and the lateral scales exhibit vertical ridges, but in smaller number, ranging from one or more anteriorly to three posteriorly; in *H. callolepis* the nuchal scales are smooth, unstriated, unarmed; the lateral scales from the anterior part of the body are marked with lines not even approximately parallel, and neither straight nor extending over the whole scale, as in the other: on the scales of the posterior part of the body, the markings are very irregular, sometimes showing as many as nine or ten irregular waving, approximately parallel, undulating lines, at others with the vertical lines coalescing

with irregularly undulating horizontal lines, to form a graceful, irregular network).

Scales arranged in 40 transverse and $11\frac{1}{2}$ longitudinal rows: In *H. sardina* 40 (38-42 according to Günther); in *H. callolepis* 38, as nearly as can be ascertained from specimens partly denuded of scales, and $10\frac{1}{2}$ longitudinal rows.

Lower jaw moderately long, its length included nearly 3 times in distance from snout to origin of dorsal, and equal to half the distance from tip of snout to the posterior margin of the operculum (in *H. clupeola* and in *H. sardina* equalling half length of head as measured above, in *H. callolepis* less than half; in *H. callolepis* contained about $2\frac{2}{3}$ times in distance from tip of snout to posterior margin of operculum, in *H. sardina* $2\frac{1}{3}$ times, in *H. pensacola* nearly 3 times).

The maxillary extends behind the front margin of the orbit, as in all species of the genus which have been examined.

Teeth very small, inconspicuous in the jaws. A large patch of asperities on the tongue nearly covering its upper surface (in *H. callolepis* this patch is much smaller, lanceolate in form); cheeks and opercula veined prominently. Gill-rakers fine, closely set, shorter than the eye, about 56 on one side of the first arch (in *H. callolepis* they are thick, stiff, wiry, not closely set, about 40 in number; in *H. sardina* they are much the same as in *H. callolepis* in shape and arrangement, and the number does not exceed 42; in *H. clupeola* they are somewhat shorter, and number at least 50).

Eye large, its diameter longer than snout, contained about 3 times in the length of the head (in *H. sardina* the length of the snout nearly equals the eye, and in *H. callolepis* this is also the case, the diameter of the eye, however, being still about $\frac{1}{3}$ of the length of the head).

Dorsal fin inserted midway between snout and base of caudal, the ventral also originating at a point equidistant from snout and origin of upper caudal lobe (in *H. clupeola* the ventral is placed midway, while the dorsal is very slightly nearer to the snout than to the base of the upper caudal lobe; in *H. callolepis* the ventral is midway, while the dorsal is nearer to the base of the upper caudal lobe by a distance nearly equal to the diameter of the pupil of the eye; in *H. sardina* the ventral is nearer to the snout, the dorsal nearer to the base of the superior caudal ray by a distance nearly equal to the diameter of the orbit).

There are 12 abdominal scutes behind the base of the ventral fin, as is the case also with *H. callolepis* and *H. sardina*, *H. clupeola* having 14.

A high shield of scales enclosing the base of the dorsal and anal fins.

D. 16; A. 17; V. 8; P. 15; C. 16 (*H. callolepis* was D. 17; A. 17; P. 16; C. 15).

Two specimens, No. 22,831 (29), were obtained by Mr. Stearns.

35. CYPRINIDÆ.

83. *Notemigonus americanus* (Linn.) Jordan.—*Roach*; *Sucker*.

A single specimen, No. 21,465 (55). D. II, 7; A. II, I, 13; P. I, 15; V. I, 7. L. lat. 47; L. trans. 15.

36. SILURIDÆ.

84. *Ariopsis felis* (Linn.) Gill & Jordan.—*Salt-water Catfish*.

A single specimen, No. 21,487 (58), $11\frac{2}{5}$ inches in length. D I, 7 + 1; A. 18; P. I, 10; V. 6.

37. ANGUILLIDÆ.

85. *Anguilla vulgaris* Turton.—*Eel*.

A single specimen, No. 22,813 (101), 22 inches in length. A stout and short-headed form, agreeing essentially with *A. bostoniensis* as defined by Günther, except that the distance between the origin of the dorsal and anal fins is considerably greater than the length of the head. The thick lips and shape of the body suggest Girard's *Anguilla tyrannus* from the Gulf of Mexico.

38. MURÆNIDÆ.

86. *Crotalopsis mordax* (Poey).

Conger mordax POEY, Mem. Hist. Nat. Cuba, ii, 1860, p. 319.

Macrodonophis mordax POEY, Rept. Fis.-Nat. Cuba, ii, 1868, p. 252, plate ii, fig. 9 (head).

This species is probably the *Crotalopsis punctifer* of Kaup,* and called by Günther *Ophichthys punctifer*. We have had no opportunity of examining the original description by Kaup, and Dr. Günther does not claim to have seen specimens of this species. We therefore provisionally adopt the name of Poey, being fully convinced that the specimen described by him is specifically identical with a specimen, No. 17,176, 33 inches in length, sent to the National Museum from Pensacola, Fla., by F. B. Stevenson, U. S. N.

A specimen, No. 22,844, was sent from West Florida by Kaiser and Martin in 1864.

87. *Gymnothorax ocellatus* Agassiz.

Gymnothorax ocellatus AGASSIZ, in Spix Pisc. Bras. 1829, p. 91, pl. L. b.

Muræna ocellata GÜNTHER, Cat. Fishes Brit. Mus. viii, 1870, p. 102.

Neomuraena nigromarginata GIRARD, Ichthyology, U. S. Geol. Survey, 1859, p. 76, pl. xli.

The Museum has a bottle, No. 5,160, containing many specimens of this species, old and young, collected in West Florida by Kaiser and Martin. The largest measure 16 inches; the smallest about 5.

* Abhandl. naturwiss. Verein Hamburg, iv, 2, 1860, (1859), p. xii, Taf. i, Fig. 3.

The coloration of these specimens is various and in general corresponds with the description given by Günther. Agassiz's figure represents a fish ornamented with fewer and larger spots than in these Florida specimens, which show the spots very closely contiguous, especially on the head. Some of these specimens show narrow longitudinal brown lines upon the throat and posterior part of the head below the branchial opening. The markings on the dorsal fin are also somewhat different from any heretofore described. We observe a regularly undulating line of white about as wide as the pupil of the eye, the upper undulations extending to the edges of the fin; between these undulations are sub-triangular spots of blackish brown, which together form an interrupted black margin to the fin. These markings, and indeed the general appearance of the fish, are perhaps best represented by Girard's figure, which, however, fails to indicate the white undulating line already mentioned.

The Museum has also a bottle, No. 5,997, containing old and young specimens of this species from Cedar Keys, Florida.

We have examined a specimen, apparently of this species, catalogued "No. 7,004, St. Joseph's Island, Texas, Geo. Würdemann," which we believe to be the original type of Girard's *Neomuraena nigromarginata*.

38. *Herpetoichthys ocellatus* (Les.).

Muraenophis ocellatus LE SUEUR, Journ. Acad. Nat. Sci. Phila. vol. v, p. 108, pl. iv, fig. 3.

A fine specimen, No. 22,289, measuring 575 millimetres.

39. *Neoconger mucronatus* Girard.

An eel-like fish, No. 5,161, 15 inches in length, sent from West Florida in 1863 or 1864 by Messrs. Kaiser and Martin, appears to have been described by Girard under the name *Neoconger mucronatus*.

39. LEPIDOSTEIDÆ.

90. *Lepidosteus platystomus* Rafinesque.—Alligator Gar; Gar Pike.

A single specimen, 15 inches in length, No. 21,485. D. 8; A. 8; P. 10; V. 6; C. 12. L. lat. 57; L. trans. $\frac{8\frac{1}{2}}{6\frac{1}{2}}$.

40. CEPHALOPTERIDÆ.

91. *Ceratoptera birostris* (Walbaum) Goodo & Bean.

Said to be of frequent occurrence in the Gulf of Mexico.

41. MYLIOBATIDÆ.

92. *Rhinoptera quadriloba* (Les.) Cuv.—Skate; Whipperee; Corn-cracker.

A large female specimen, No. 21,221.

42. TRYGONIDÆ.

93. *Trygon sabina* LE SUEUR.—*Stingaree*.

A single specimen, No. 21,470 (40), length of body $6\frac{3}{10}$ inches; width of body $6\frac{1}{5}$ inches; length of tail $7\frac{3}{8}+$ inches.

A specimen, No. 22,804, length of body 11 inches; width 10 inches; length of tail $11\frac{2}{10}$ inches. ♀ with tail of young protruding.

A young male, No. 22,818, $3\frac{3}{10}$ inches in length; width of body $3\frac{1}{2}$ inches; length of tail 7 inches.

43. GALEORHINIDÆ.

94. *Hypoprion brevirostris* Poey.

This Cuban species was collected in West Florida by Dr. J. W. Velie.

44. GINGLYMOSTOMATIDÆ.

95. *Ginglymostoma cirratum* (Gmelin) M. & H.

A large individual was obtained in West Florida by Dr. J. W. Velie.

NOTE.—The following new species from the Gulf of Mexico are enumerated in this paper. Those marked by asterisks have been described on previous pages of these Proceedings; those in italics were first sent by Mr. Stearns.

- 29. *Seriola Stearnsii*, Goode & Bean.*
- 33. *Caulolatilus microps*, Goode & Bean.*
- 42. *Eucinostomus harengulus*, Goode & Bean.
- 46. *Pagellus Milneri*, Goode & Bean.
- 50. *Lutjanus Stearnsii*, Goode & Bean.*
- 51. *Lutjanus Blackfordii*, Goode & Bean.*
- 55. *Epinephelus Drummond-Hayi*, Goode & Bean.*
- 59. *Trisotropis microlepis*, Goode & Bean.
- 71. *Chirostoma peninsulæ*, Goode & Bean.
- 72. *Chirostoma vagrans*, Goode & Bean.
- 79. *Brevoortia patronus*, Goode.*
- 82. *Harengula pensacolæ*, Goode & Bean.
- (82 a. *Harengula callolepis*, Goode, from Bermuda.)

NOTES ON NEW ENGLAND ISOPODA.

By OSCAR HARGER.

The marine Isopoda collected by the United States Commission of Fish and Fisheries having been placed in my hands by Professor Verrill, a report has been prepared including full descriptions, with figures of most of the species, except the *Bopyridæ*. Besides the collections of the Fish Commission, I have, through the kindness of Professor Verrill, had access to other extensive collections made principally by himself and Prof. S. I. Smith, at various points along the coast from Great Egg Harbor, New Jersey, to the Bay of Fundy, as is more fully detailed in the report now ready for publication. On account of unexpected delay in the publication of the report, it has been thought best to prepare the following brief summary of its contents, with especial reference to facts not hitherto published. Only such references are here given as are necessary to the understanding of the names adopted, and, in general, the distribution on the New England coast only is indicated.

The *Bopyridæ* have been identified by Professor S. I. Smith, who has also rendered other important assistance in the preparation of the report, of which the present paper may be regarded as an abstract.

The *Oniscidæ*, not being properly marine, are in general not included in the report; but three species, two of them as yet found only on the coast, are included as being commonly found by marine collectors. They are the first three of the following list, which embraces also all the marine Isopoda known to inhabit the waters of New England:

Philoscia vittata Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 429, 1818.

A southern species found as far north as Barnstable, Mass.

Scyphacella arenicola Smith, Rep. U. S. Fish Com., part i, p. 563 (274), 1874.

Sandy beaches, from Great Egg Harbor, New Jersey, to Nantucket, Mass. Not yet found north of Cape Cod.

Actoniscus ellipticus Harger, Am. Jour. Sci., III, vol. xv, p. 373, 1878.

Shores of Long Island Sound at Savin Rock, and Stony Creek, near New Haven. Collected by Professor Verrill.

Cepon distortus Leidy, Jour. Acad. Nat. Sci. Phil., II, vol. iii, p. 150, pl. xi, figs. 26-32, 1855.

"Branelial cavity of *Gelasimus pugilator*, Atlantic City, New Jersey."

Gyge Hippolytes Bate and Westwood, Brit. Sess. Crust., vol. ii, p. 230, 1868.—*Bopyrus Hippolytes* Kröyer, Grönlands Amphipoder, p. 306, pl. iv, fig. 22, "1838."

Parasitic on *Hippolyte*, etc., and found as far south as Massachusetts Bay.

Thryxus abdominalis Lilljeborg, Öfversigt af Kongl. Vetenskaps Akademiens Förh. Stockholm, 1852, p. 11.—*Bopyrus abdominalis* Krøyer, Naturhist. Tidssk., Bind iii, p. 102, 289, pl. 1, 2, (1840); Gaimard's Voyage en Scandinavie, etc., Atlas, pl. xxix, fig. 1 a-u, "1849."

Parasitic on *Pandalus*, *Hippolyte*, etc., and found as far south as Massachusetts Bay.

Dajus mysidis Krøyer, Gaimard's Voyage en Scandinavie, etc., Atlas, pl. xxviii, fig. 1, "1849."—*Bopyrus mysidum* Packard, Mem. Soc. Nat. Hist. Boston, vol. 1, p. 295, pl. viii, fig. 5, 1867.

Parasitic on *Mysis*, but not hitherto found south of Labrador.

Jæra albifrons Leach, Edinburgh Encyclopædia, vol. vii, p. 434, "1813-14"; Trans. Linn. Soc. London, vol. xi, p. 373, 1815.—*Jæra copiosa* Stimpson, Mar. Invert. Grand Manan, p. 40, pl. iii, fig. 29, 1853.

Common throughout the New England coast under sea-weed, in tide pools, etc. A comparison of specimens received from Oban, Scotland, through the kindness of Rev. A. M. Norman, indicates that our species must be regarded as identical with the well-known British species, and is therefore common to the two coasts.

Janira alta = *Asellodes alta* Stimpson, Mar. Invert. Grand Manan, p. 41, pl. iii, fig. 30, 1853.

A northern species not as yet found south of Massachusetts Bay, occasionally collected in tide-pools, but usually dredged, and extending to a depth of 190 fathoms.

This species is easily distinguished specifically from *J. maculosa* Leach, the type of the genus, but does not appear to differ by characters of generic importance, and I have therefore referred it to the older genus.

Janira spinosa, n. sp.

A second species of this genus was obtained in the summer of 1878, and on examination it appears to be as yet undescribed, although somewhat resembling *J. laciniata* G. O. Sars, but distinguished by the double instead of single row of spines along the dorsal region of the thorax.

The head is strongly rostrate, and has the antero-lateral angles acutely produced, but shorter than the median rostrum. The eyes are small and black, and placed a little behind the middle of the head, at about an equal distance from the median line and the lateral margin. The antennulæ are slender, and slightly surpass the first four segments of the antennæ. The antennæ are about as long as the head and thorax together, and the scale attached to the second peduncular segment is slender and pointed, surpassing the third segment. The flagellum forms about half the length of the antenna, and is slender, tapering, and multi-articulate.

The thoracic segments are all acutely produced at the sides into one or two salient angles, forming a row of acute serrations along the sides of the body. The first segment has a single angle produced somewhat

forward around the sides of the head; the second, third, and fourth segments usually present two serrations, both the anterior and posterior angles being produced and acute, and the last three segments are produced and directed more and more backward. In the dorsal region, each segment bears a pair of sharp tubercles or spines. Anteriorly these spines are near the front margins of the segments and directed forward, but become posteriorly more erect and nearer the middle of the segment, and the last three pairs are directed backward, the last pair being near the hinder margin of the seventh segment. The legs are slightly spiny, the first pair but little thickened in the females. The pleon tapers at the sides, where it is minutely serrulate. Its posterior angles are salient and acute, like the anterior angles of the head. The uropods are of moderate length, about as long as the pleon, and composed of a cylindrical basal segment, bearing two rami, of which the inner is somewhat the larger, and nearly as long as the basal segment. Both, together with the basal segment, are sparingly bristly.

The color in alcohol is nearly white. Length 8^{mm}.

Two specimens of this species were collected at Banquereau by Captain Collins, of the schooner Marion, August 25, 1878. They were found adhering to the cable of the schooner.

Munna Fabricii Kröyer, Naturhist. Tidssk., II, Bind ii, p. 380, 1847; Gaimard's Voyage en Scandinavie, etc., Atlas, pl. 31, figs. 1 a-q, 1849.

Casco Bay, near Portland, Me., Eastport and Western Bank, from low water to 150 fathoms.

Munnopsis typica M. Sars, Christiania Vidensk. Selsk., 1860, p. 84, 1861; Bidrag til Kundskab om Christiania Fjordens Fauna (Nyt Magazin), p. 70, pl. vi, vii, figs. 101-138, 1868.

This species has been taken in the Bay of Fundy in 60 fathoms; also, by Mr. J. F. Whiteaves, in the Gulf of Saint Lawrence.

Eurycope robusta Harger, Am. Jour. Sci., III, vol. xv, p. 375, 1878.

Not yet found south of the Gulf of Saint Lawrence, where it was taken by Mr. J. F. Whiteaves in 220 fathoms, muddy bottom.

Chiridotea cæca Harger, Am. Jour. Sci., III, vol. xv, p. 374, 1878.—*Idotea cæca* Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 424, 1818.

Common on the southern coast of New England, and taken as far north as Halifax in the summer of 1877.

Chiridotea Tuftsii Harger, Am. Jour. Sci., III, vol. xv, p. 374, 1878.—*Idotea Tuftsii* Stimpson, Mar. Invert. Grand Manan, p. 39, 1853.

This species has been taken at various points along the coast from Long Island Sound to Halifax, but was regarded as rare until the summer of 1878, when it was collected in abundance at Gloucester, Mass.

Idotea irrorata Edwards, Hist. nat. des Crust., tome iii, p. 132, 1840.—*Stenosoma irrorata* Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 423, 1818.—*Idotea tricuspidata* Desmarest, Dict. des Sci. nat., tome xxviii, p. 373, 1823; Consid. Crust., p. 289, 1825.

This species is common throughout the coast of New England, but is more abundant southward, being to a great extent replaced toward the north by the next species.

A comparison of English and European specimens with our own leaves no doubt of the identity of the species on the opposite coasts of the Atlantic. Being a common European species, it has been mentioned by many authors under a variety of names, which are more fully quoted and discussed in the report. Say's name appears to be the earliest that can be certainly connected with the species.

Idotea phosphorea Harger, Rep. U. S. Fish Com., part i, p. 569 (275), 1874.

Found throughout the coast, but more abundant northward.

Idotea robusta Krøyer, Naturhist. Tidssk., II, Bind ii, p. 108, 1846; Gaimard's Voyage en Scandinavie, etc., Atlas, pl. xxvi, fig. 3 a-r, 1849.

A pelagic species.

Synidotea nodulosa Harger, Am. Jour. Sci., III, vol. xv, p. 374, 1878.—*Idothea nodulosa* Krøyer, Naturhist. Tidssk., II, Bind ii, p. 100, 1846; Gaimard's Voyage en Scandinavie, etc., Atlas, pl. xxvi, fig. 2, 1849.

A northern species, found at Halifax, N. S., and 125 miles southward, in from 16 to 190 fathoms. Also from George's Bank.

Synidotea bicuspidata = *Idotea bicuspidata* Owen, Voyage of the Blossom, Crustacea, p. 92, pl. xxvii, fig. 6, 1839.—*Idotea marmorata* Packard, Mem. Soc. Nat. Hist. Boston, vol. i, p. 296, pl. viii, fig. 6, 1867.—*Idotea pulchra* Lockington, Proc. Cal. Acad. Sci., vol. vii, p. 45, 1877.

The determination of the synonymy of this species rests principally upon the work of Messrs. Streets and Kingsley in the Bulletin of the Essex Institute, vol. ix, p. 108, 1877. It has not yet been found south of the Grand Bank.

Erichsonia filiformis Harger, Rep. U. S. Fish Com., part i, p. 570 (276), pl. vi, fig. 26, 1874.—*Stenosoma filiformis* Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 424, 1818.

A southern species, not yet found north of Cape Cod.

Erichsonia attenuata Harger, Rep. U. S. Fish Com., part i, p. 570 (276), pl. vi, fig. 27, 1874.

Great Egg Harbor, New Jersey, and Noank, Conn. The species will probably be found at other localities, among eel-grass, on the southern shore of New England.

Epelys trilobus Smith, Rep. U. S. Fish Com., part i, p. 571 (277), pl. vi, fig. 28, 1874.—*Idotea triloba* Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 425, 1818.

A southern species, rare north of Cape Cod, but extending, with some other southern species, to Quahog Bay, on the coast of Maine.

Epelys montosus Harger, Rep. U. S. Fish Com., part i, p. 571 (277), 1874.—*Idotea montosa* Stimpson, Mar. Invert. Grand Manan, p. 40, 1853.

Replaces the preceding species for the most part at the north, but found also as far south as Long Island Sound. It has been obtained from a depth of 40 fathoms.

Astacilla granulata = *Leachia granulata* G. O. Sars, Arch. Math. og Naturvid. Christiania, B. ii, p. 351 (proper paging 251), 1877.—*Astacilla Americana* Harger, Am. Jour. Sci., III, vol. xv, p. 374, 1878.

St. George's Banks, 1877, and Banquereau, 1878. I have seen no specimens of Sars's species for comparison, but his description appears to apply perfectly to the specimens described by myself before seeing his paper.

Sphæroma quadridentatum Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 400, 1818.

A southern species, scarcely passing north of Cape Cod, but occurring at Provincetown, Mass.

Limnoria lignorum White, Pop. Hist. Brit. Crust., p. 227, 1857.—"*Cymothoa lignorum* Rathke, Skrivt. af Naturl. Selsk. v. 101, t. 3, f. 14, 1799."—*Limnoria terebrans* Leach, Edinburgh Encyc., vol. vii, p. "433, 1813-14"; Trans. Linn. Soc. London, vol. xi, p. 371, 1815.

This genus was associated with the *Asellidae* by Edwards without an examination of the specimens, and, so far as I know, he has been followed by recent authors. An examination of its structure appears to point unmistakably to affinity with the *Spheromidae*. I have not, however, thought best to include it in that family, but have placed it in a family by itself, the *Limnoriidae*.

The species extends throughout the New England coast.

Cirolana concharum = *Conilera concharum* Harger, Rep. U. S. Fish Com., part i, p. 572 (278), 1874.—*Ega concharum* Stimpson, Mar. Invert. Grand Manan, p. 42, 1853.

Not found north of Cape Cod, but abundant at Vineyard Sound.

Cirolana polita = *Conilera polita* Harger, in Smith and Harger, Trans. Conn. Acad., vol. iii, p. 3, 1874.—*Ega polita* Stimpson, Mar. Invert. Grand Manan, p. 41, 1853.

St. George's Banks, Salem, and Eastport (Stimpson), rare.

Æga psora Krøyer, Grönlands Amphipoder, p. 318, "1838."—*Oniscus psora* Linné, Syst. Nat., ed. x, tom. i, p. 636, 1758.—*Ega emarginata* Leach, Trans. Linn. Soc. London, vol. xi, p. 370, 1818.

Parasitic on the Cod, Halibut, etc.; also dredged on St. George's Banks.

Nerocila munda Harger, Rep. U. S. Fish Com., part i, p. 571 (277), 1874.

On dorsal fin of *Ceratacanthus aurantiacus*, Vineyard Sound.

Ægathoa loliginea Harger, Am. Jour. Sci., III, vol. xv, p. 376, 1878.

Mouth of Squid, New Haven, Conn.

Livoneca ovalis White, List Crust. Brit. Mus., p. 109, 1847.—*Cymothoa ovalis* Say, Jour. Acad. Nat. Sci. Phil., vol. i, p. 394, 1818.

White and several other British carcinologists use the orthography *Lironeca*; but in the Dictionnaire des Sciences naturelles, tome xii, where the genus is established by Dr. Leach, the name occurs, in French and Latin, nine times on pages 352 and 353, spelled always with *v* as the third letter. I have, therefore, adhered to that orthography, although there is reason for supposing that Dr. Leach intended to use the form *Lironeca*.

Parasitic on Bluefish, etc.; not yet found north of Cape Cod.

Anthura polita Stimpson, Proc. Acad. Nat. Sci. Phil., vol. vii, p. 393, 1855.—*Anthura brunnea* Harger, Rep. U. S. Fish Com., part i, p. 572 (278), 1874.

A southern species, not found north of Cape Cod until the summer of 1878, when it was taken at Gloucester, Mass. Usually found among Eel-grass or mud in shallow water.

Paranthura brachiata = *Anthura brachiata* Stimpson, Mar. Invert. Grand Manan, p. 43, 1853.

A northern species, but found as far south as Vineyard Sound, from 27 to 115 fathoms.

Ptilanthura tenuis Harger, Am. Jour. Sci., III, vol. xv, p. 377, 1878.

Rare, but found throughout the New England coast. The remarkably elongate flagellum of the antennulæ belongs to the males only.

Gnathia cerina = *Praniza cerina* Stimpson, Mar. Invert. Grand Manan, p. 42, pl. iii, fig. 31, 1853; and, also, *Anceus Americanus* Stimpson, op. cit., p. 42, 1853; the former being the female form and the latter that of the adult male.

A northern species, not yet found south of Cape Cod, occurring in from 10 to 220 fathoms, and, in the young stages, parasitic on fish.

Tanais vittatus Lilljeborg, Bidrag til Känn. Crust. Tanaid., p. 29, 1865.—*Crossurus vittatus* Rathke, Fauna Norwegens, (Nova Acta Acad., vol. xx.) p. 39, pl. i, figs. 1-7, 1843.

This species has been found at Noank Harbor, Conn., and will probably be found at other localities on our coast. I have had no European specimens for comparison, and, unfortunately, have not had access to some important European literature on the subject, but do not know of any character by which to distinguish it from Rathke's species, and have therefore regarded it as identical.

This genus is well separated from the next by the pleon, which bears only three pairs of pleopods and uniramous uropods, and by the remarkable incubatory sacs attached to the fifth thoracic segment of the females, and unlike anything else found among the *Isopoda*. They have been described by Rathke, Willemoes-Suhm, and others.

Leptochelia algicola = *Paratanais algicola* Harger, Am. Jour. Sci., III, vol. xv, p. 377, 1878.—*Leptochelia Edwardsii* Bate and Westwood, Brit. Sess. Crust., vol. ii, p. 134, 1868, (males).—*Tanais filum* Harger, Rep. U. S. Fish Com., part i, p. 573 (279), 1874, not of Stimpson.

A male specimen, received from Guernsey, through the kindness of

Rev. A. M. Norman, appears to agree perfectly with the males of this species, though not with Kröyer's description of *Tanais Edwardsii*. I have not therefore united my species with his, though I think it possible they may prove identical.

The species occurs in considerable abundance at Noank Harbor, Conn., among algæ, and also at Vineyard Sound, and will probably be found at other localities on the southern shore of New England. It has also been collected by Professor Verrill, during the present summer, at Provincetown, Mass., in company with *Limnoria* and *Chelura*, in old piles.

The genus *Leptochelia* has several years' priority over *Paratanais*, and, though founded on the male sex, ought, as I think, to be retained.

Leptochelia limicola = *Paratanais limicola* Harger, Am. Jour. Sci., III, vol. xv, p. 378, 1878.

Massachusetts Bay, off Salem, 48 fathoms, mud.

Leptochelia rapax, n. s.

Females of this species considerably resemble those of *L. limicola*, but may be distinguished by the following characters: The eyes are larger and more conspicuous; the last segment of the antennulæ is scarcely longer than the preceding, instead of nearly twice as long, as in *L. limicola*; the dactylus of the second pair of legs is somewhat shorter and the terminal spine less attenuated, and the external ramus of the uropods consists of a single very short and small segment, shorter than the basal segment of the inner ramus, which is not elongated. The inner ramus is five-jointed, instead of six-jointed, as in *L. algicola*.

The males are remarkable for the long and slender prehensile hand terminating the first pair of legs. The body of the males is short and robust, with the segments well marked by constrictions. The head, with the united first thoracic segment, is short and rounded, bulging strongly at the sides just behind the eyes, which are conspicuous, somewhat less in diameter than the bases of the antennulæ, distinctly articulated, and coarsely faceted. The antennulæ are elongated, especially in the basal segment, which is more than one-third as long as the body, slightly swollen on the inner side, near the base, then tapering to the tip; the second segment is cylindrical, less than half as long as and more slender than the first; the third is less than half the length of the second, and is followed by about eight short flagellar segments, the last one tipped with setæ. The antennæ, when extended, do not attain the end of the basal antennular segment; the first three segments are short, the fourth longest, being longer than the first three together, the fifth slender and tipped with setæ. The terminal setæ of both antennulæ and antennæ arise in part from minute or rudimentary terminal segments. The first pair of legs forms the most striking feature of this species. These legs, when extended, are in general longer than the body of the animal, though they vary considerably in size, being usually proportionally smaller in the smaller specimens. In these legs, the segments preceding the carpus are short and robust; but the carpus is about half as long as the body, and the propodus

is even somewhat longer than the carpus, and usually strongly flexed beneath it. More than half the length of the propodus is made up of the slender digital process, which bears a low tooth on the inner side, near the base, and a stouter one near the slender incurved tip. The dactylus is slender, curved, and pointed, and armed with a few weak spinules along the inner margin. The forceps thus formed are capable of seizing and closing around the body of another individual.

The thoracic segments, except the first, are well separated; the second (first free) segment is shortest; the third, fourth, and fifth segments are of increasing length; the sixth is as long as the fifth; the seventh shorter. The first five segments of the pleon are of about equal length; the sixth shorter and obtusely pointed in the middle. The uropods consist on each side of a robust basal segment, bearing two rami, the outer short, and composed of a single segment, the inner five-jointed and tapering. Both rami are sparingly bristly. The males vary in length from 2.6^{mm} to 3.8^{mm}, and in breadth from 0.6^{mm} to 0.8^{mm}. The females are more slender. Color in alcohol nearly white or marked in the males by a brownish transverse band along the posterior margin of each segment.

This species was collected by Professor Hyatt and Messrs. Van Vleck and Gardner at Annisquam, Mass., in the summer of 1878.

Leptochelia filum = *Tanais filum* Stimpson, Mar. Invert. Grand Manan, p. 43, 1853.

"Bay of Fundy," Stimpson.

Leptochelia cæca = *Paratanais cæca* Harger, Am. Jour. Sci., III, vol. xv, p. 378, 1878.

Collected along with *L. limicola* in 48 fathoms, mud, Massachusetts Bay, off Salem, 1877.

Of the forty-three species enumerated in the preceding list, the following eighteen have as yet been found only north of Cape Cod:

<i>Gyge Hippolytes</i> Bate and West-wood.	<i>Synidotea bicuspidata</i> Harger.
<i>Phryxus abdominalis</i> Lilljeborg.	<i>Astacilla granulata</i> Harger.
<i>Dajus mysidis</i> Kröyer.	<i>Cirolana polita</i> Harger.
<i>Janira alta</i> Harger.	<i>Æga psora</i> Kröyer.
<i>Janira spinosa</i> Harger.	<i>Gnathia cerina</i> Harger.
<i>Munna Fabricii</i> Kröyer.	<i>Leptochelia limicola</i> Harger.
<i>Munnopsis typica</i> M. Sars.	<i>Leptochelia rapax</i> Harger.
<i>Eurycope robusta</i> Harger.	<i>Leptochelia filum</i> Harger.
<i>Synidotea nodulosa</i> Harger.	<i>Leptochelia cæca</i> Harger.

The following ten have been found only south of Cape Cod:

<i>Scyphacella arenicola</i> Smith.	<i>Cirolana concharum</i> Harger.
<i>Actoniseus ellipticus</i> Harger.	<i>Nerocila munda</i> Harger.
<i>Cepon distortus</i> Leidy.	<i>Ægathoa loliginea</i> Harger.
<i>Erichsonia filiformis</i> Harger.	<i>Livoneca ovalis</i> White.
<i>Erichsonia attenuata</i> Harger.	<i>Tanais vittatus</i> Lilljeborg.

The following fifteen have been found both north and south of Cape Cod:

<i>Philoscia vittata</i> Say.	<i>Epelys montosus</i> Harger.
<i>Jæra albifrons</i> Leach.	<i>Spheromu quadridentatum</i> Say.
<i>Chiridotea cæca</i> Harger.	<i>Limnoria lignorum</i> White.
<i>Chiridotea Tuftsii</i> Harger.	<i>Anthura polita</i> Stimpson.
<i>Idotea irrorata</i> Edwards.	<i>Paranthura brachiata</i> Harger.
<i>Idotea phosphorea</i> Harger.	<i>Ptilanthura tenuis</i> Harger.
<i>Idotea robusta</i> Kröyer.	<i>Leptochelia algicola</i> Harger.
<i>Epelys trilobus</i> Smith.	

The following eleven species occur also on the coast of Europe:

<i>Gyge Hippolytes</i> Bate and Westwood.	<i>Astacilla granulata</i> Harger.
<i>Phryxus abdominalis</i> Lilljeborg.	<i>Limnoria lignorum</i> White.
<i>Jæra albifrons</i> Leach.	<i>Æga psora</i> Kröyer.
<i>Munna Fabricii</i> Kröyer.	<i>Tanais vittatus</i> Lilljeborg.
<i>Munnopsis typica</i> M. Sars.	<i>Leptochelia algicola</i> Harger.
<i>Idotea irrorata</i> Edwards.	

**NOTICE OF RECENT ADDITIONS TO THE MARINE INVERTEBRATA,
OF THE NORTHEASTERN COAST OF AMERICA, WITH DESCRIPTIONS
OF NEW GENERA AND SPECIES AND CRITICAL REMARKS
ON OTHERS.**

PART I—ANNELIDA, GEPHYRÆA, NEMERTINA, NEMATODA, POLYZOA, TUNICATA,
MOLLUSCA, ANTHOZOA, ECHINODERMATA, PORIFERA.

By A. E. VERRILL.

Among the very extensive collections made during the past eight years by the U. S. Commission of Fish and Fisheries, under the direction of Professor Baird, there are still many species not recorded as American in any of the reports hitherto published; most of these are well-known Arctic or Northern European species, but others are still undescribed. As the final reports on the different groups will require a long time for their completion, owing to the vast number of specimens to be examined from more than a thousand localities, it has been thought desirable to record some of the more important additions to the fauna, without further delay.* More detailed descriptions and numerous figures will be published in the final reports, together with the details of their geographical distribution. All the species included in the following list, unless otherwise stated, have been collected by the U. S. Fish Commission.

*Many species have also been recorded in various articles in the American Journal of Science and Arts, during several years past. See, also, an important paper on the Podophthalmous Crustacea, by Professor S. I. Smith, and one on the Pycnogonida, by E. B. Wilson, in the Trans. Conn. Academy, vol. v, 1879.

ANNELIDA.

Sthenelais gracilis, sp. nov.

A small, slender, delicate species. Scales white, smooth, outer edge with few (12-16) very small, unequal, tapering papillæ, which are not crowded, the longest about as long as the intervening spaces. Head short, broad, the posterior and lateral margins rounded, the front emarginate. Eyes black, conspicuous; the posterior pair on the dorsal surface in advance of the middle of the head; anterior pair nearer together, close to the anterior margin; median antenna long, stout at base, tapering to a slender tip; the palpi have about the same form and length as the median antenna. Dorsal setæ longer than the ventral, extremely slender, tapering gradually toward the very fine tips, and very minutely serrulate. Upper ventral setæ (2-4) simple, very slender, with the shaft smooth, the serrate portion broader, with rather long ascending spinules, the tips tapering to a long fine point; the median setæ, above the acicula, have longer, much stouter, smooth shafts, expanded distally, with the terminal portion long, curved, divided into eight to twelve imperfect joints, tapering to very slender capillary tips, which are mostly acute, sometimes faintly hooked. Below the acicula there are others, similar in structure, but with the shaft not so stout, and with the terminal piece shorter, with fewer joints; the lower portion of the fascicle consists of numerous, much more slender, capillary setæ, with smooth shafts and very long, slender, tapering, terminal pieces, composed of ten to twelve or more imperfect joints.

Harbor of Gloucester, Mass., 7 to 10 fathoms, sand, 1879 (U. S. Fish Commission). Described from alcoholic specimens.

Sthenelais Emertoni, sp. nov.

A small, slender species, with white, translucent scales, their outer edge with very small, nearly equal, slender papillæ, often slightly clavate at tip, and rather near together, their interspaces being mostly less than their length; surface partially covered with minute rounded verruæ.

Dorsal setæ very slender, capillary, very minutely transversely serrulate. Few (about 4) upper ventral setæ, simple, long, slender, with the terminal portion sharply serrulate, the tips fine and sharp; next to these are some slender compound setæ, the terminal piece slender, straight, of moderate length, acute, with six to eight imperfect joints; the median setæ have much stouter, smooth shafts, expanded distally, and a nearly straight, short, rapidly tapering, sharply pointed, terminal piece, of four to six joints; below these are some with similar though smaller shafts, and a short, stout, terminal piece, hooked at the tip, and with a sharp ascending spine at about the distal third; others of the same size have the terminal piece very acute, with six to eight or more joints; the lowest are very slender, with a longer, very fine, tapering, terminal piece, imperfectly divided into about four to six joints, at each of which there is a projecting acute angle like a tooth; the last of

these is not far from the minute curved tip, so that the tip often appears as if bifid. In this character it approaches the genus *Eusthenelais* of M'Intosh, the validity of which may be doubtful.

Salem Harbor, Mass., on muddy bottoms (J. H. Emerton, 1879). Described from alcoholic specimens.

***Sthenelais picta* Verrill.**

In this species, the scales are partially covered with very small, round, slightly prominent, obtuse verrucæ, and the free margin bears a row of small, simple, rather slender, tapering or fusiform, mostly acute papillæ, which are of unequal lengths, and placed at irregular distances, but sometimes in small clusters. The setæ of the dorsal ramus are numerous, long and slender, but varying in size and length, the median and lower ones being much the stoutest and rather strongly serrulate. In the superior group of the lower ramus are several very acute setæ, strongly spirally spinulate toward the end; next to these are two or three, or more, slightly longer, compound setæ, with slender shafts, serrulate near the joint, and bearing a long, slender, terminal piece, imperfectly jointed in the middle and slightly bifid at tip; below these are numerous, stout, compound setæ, mostly shorter, with stouter, smooth shafts, enlarged distally, and bearing a short, thick, terminal piece, which is decidedly hooked and bifid at the tip; some of the upper ones in this group have the terminal piece more than twice longer than broad, but most of them have it triangular and little longer than broad; the next series of setæ are slender, some with smooth shafts and a slender, tapering, terminal portion, composed of two or three indistinct joints, and bifid at tip; others, among the most inferior setæ, have a slender shaft, serrulate distally, with a simple, slender, terminal piece, bifid at tip, or more properly with a slender spine-like process arising near to, and nearly as long as the sharp, incurved tip, which is opposed to it. Grows to the length of 6 to 8 inches or more.

Barnstable and Provincetown, Mass., to Virginia, in sand, at low-water.

***Sigalion arenicola*, sp. nov.**

An elongated, moderately stout, depressed species, narrowed and tapered posteriorly, and bearing very numerous, large, thin, white, translucent, smooth scales, which have large pinnate processes on their posterior edge.

Head small, shield-shaped, widest anteriorly, with a broad, slightly rounded lobe in front; and with the anterior angles rounded; ocelli small, but distinct, forming a quadrangle on the top of the head, the two pairs near together. A pair of minute, obtuse antennæ at the front edge; no trace of a median antenna. Scales, except the smaller, rounded, anterior ones, large and somewhat quadrangular, with three of the angles rounded; on the posterior border there are about eight to ten well-separated, large, deeply pinnate processes, borne on simple, slender

stems; the pinnate portion is broad-ovate, longer than the stems, with about four to six long, slender pinnae on each side. The setae are very numerous and complicated. Those of the dorsal fascicle are long, slender, capillary, mostly curved inward over the back. In the lower fascicles there are several kinds: the upper (*a*) are two to four simple ones, with long, tapering, strongly spinulated, very acute tips; the next (*b*) are several compound setae, with the shaft stouter and strongly serrulated near the end, while the terminal piece, of variable length, is composed of many joints, and is minutely bifid at the tip; the next (*c*) are about six to eight stout, compound setae, arising both above and below the supporting aciculæ, and having their shafts minutely and closely circularly serrulate toward the end, and with a short, stout, tapering, undivided, terminal piece, which has a hooked, claw-like tip, with a sharp secondary process opposed to it; below these are (*d*) numerous long, slender, compound setae, with shafts scarcely or not at all serrulate, and with the subdivided terminal piece minutely bifid at the tip, varying in length and number of joints, the middle ones being comparatively stout, with the terminal piece tapering and not very slender, while the lower ones are very slender and capillary, with a very long, tapering, terminal piece, of many joints. Color nearly white or pale flesh-color. Length of largest, 80^{mm} to 100^{mm}.

Vineyard Sound and off Nantucket Island, Mass., 10 to 20 fathoms, clean silicious sand, 1875. Shores of Cape Cod Bay, in sand, at low-water, at Barnstable (A. E. V.), and Provincetown (H. E. Webster).

This elegant species is allied to *S. Buskii* McIntosh, and has similar appendages to the scales. In our species, however, the pinnate processes are less crowded and have longer stems and fewer and longer pinnae.

***Lætmatonice armata*, sp. nov.**

Lætmatonice filicornis Verrill, formerly, in Amer. Jour. Science (*non* Kinberg).

Body stout, depressed, broadest in the middle, tapered slightly toward both ends, the posterior most obtuse. Back covered with large, thin, white, smooth scales, usually more or less concealed by a felt-like coating, to which mud and dirt adhere. Lower surface granulous. Head small, but prominent, with two minute, rounded, tubercle-like antennae in front and a median antenna arising between them, which has a stout, tapering base, but becomes very slender for most of its length; it is much shorter than in *L. filicornis*, its tip not reaching to the basal third of the palpi. The latter are large and long, regularly tapered to the end, three to four times as long as the median antenna and four or five times as thick. The first parapodia bear two slender cirri on the upper ramus, which are about as large as the median antenna. The scales are large, smooth, and translucent, without appendages, mostly broadly rounded on the inner and posterior edges, and deeply emarginate on the outer attached border. The upper rami of the parapodia bear, besides

several divergent clusters of capillary setae, a group, sometimes of six to eight, long, stout, spine-like, dark brown, acute and barbed setae, having several short recurved hooks on each edge of the flattened tips, near the end. The ventral rami of the parapodia are prominent and bear three, or more, stout, elongated, brown setae, with sharp, somewhat recurved tips, which are covered along the convex side with slender, sharp spinules; at the end of the straight shaft, and separated by a naked space from the spinulated portion, there is a strong, sharp, divergent spine. Length of a medium-sized specimen, 32^{mm}; breadth, exclusive of setae, 13^{mm}; length of palpi, 7^{mm}.

Common on muddy bottoms in the Bay of Fundy and Gulf of Maine, in 50 to 150 fathoms. Collected first in 1864, 1865, and 1868, by the writer and Professor S. I. Smith, and subsequently by the U. S. Fish Commission, in many localities.

It differs from *L. filicornis*, with which it was formerly identified by me, not only in having a much smaller median antenna, but also in the character of the setae, especially those of the ventral fascicle. Whether the Gulf of St. Lawrence specimens, recorded by McIntosh as *L. filicornis*, belong to this species, is uncertain.

Eunoa spinulosa, sp. nov.

Body large, oblong, rather narrow, of nearly equal breadth through the greater part of its length. Head dark, deeply bilobed in front, the sides rounded; each lobe terminates in an anterior, acute, white point. Eyes large, lateral, the anterior farther apart than the posterior. Median antenna rather small, about twice as long as the head, tapering to a slender point; lateral antennae smaller and about half as long as median; palpi moderate, smooth, much stouter and longer than the antennae; tentacular and dorsal cirri long, slender, covered with numerous slender papillae. Scales large, broad, rounded-oblong, the posterior part being produced and broadly rounded, the surface covered with minute, rounded grains and toward the border with very small, elongated, tapering, acute spinules; outer edge fringed with numerous small, slender papillae. Setae yellow, very abundant, forming large, dense tufts. Those of the upper parapodia are in part as long as those of the lower, and much stouter; the upper ones are shortest, unequal, stout, curved, spine-like, acute, finely and closely transversely serrulate throughout most of their length, only a very small tip being smooth; below these there is a group of longer and smoother spine-like setae, the serrulation less distinct and not extending so far toward the base nor so near to the tip. The ventral parapodia have very numerous setae, less than half as thick as the upper ones, but the longest about equal to or somewhat exceeding those of the upper fascicle; they are all of one general form, decreasing much in length toward the lower side; the shaft is long and smooth, the distal portion enlarged, somewhat curved, closely spinulated, ending in a short, smooth, slightly incurved, acute tip. Length (a few posterior segments

lacking), 5.5^{mm}; breadth, including setæ, 16^{mm}; breadth of body alone, 6^{mm}; length of largest scales, 8^{mm}; breadth, 5.5^{mm}.

One specimen, in alcohol. Sable Island Bank, off Nova Scotia, Captain McPhee, schooner "Carl Schurz," November, 1878 (U. S. Fish Commission).

Autolytus ornatus, sp. nov.

A small, slender species. The female form is easily distinguished by the bright red color of the ova and embryos, showing conspicuously through the pale yellowish integuments of the body, or incubatory sac. The head is short, broad, slightly emarginate in front; eyes conspicuous, lateral, rounded; antennæ nearly equal, the median one a little the longest; lateral ones about twice the length of the head. Dorsal cirri long, slender, about equal to the diameter of the body. The three anterior segments bear only short setæ, but fascicles of long setæ commence on the fourth; these are nearly as long as the breadth of the body. Length, about 5^{mm}.

Vineyard Sound, at surface, July 13 and August 28, 1875.

Another form, possibly the male of this species, was taken July 21. This was bright green in color. The lateral antennæ were of moderate length, tapered, swollen at base; odd median antenna and upper tentacular cirri slender, very long, about equal to half the body. Dorsal cirri long, more than half the diameter of the body. Fascicles of long setæ commence on the fourth segment.

Odontosyllis lucifera Verrill.

Eusyllis lucifera Verrill, Amer. Jour. Science, vol. x, p. 39, 1875.

An examination of the armature of the œsophagus of this species shows that it belongs to the genus *Odontosyllis*. The chitinous rim is somewhat horseshoe-shaped, the extremities often angular or tooth-like, turning inward and downward, while the opposite side bears a row of about six small, sharp, incurved denticles. Anal cirri two, rather long and slender, transversely lined.

Pedophylax longiceps, sp. nov.

A very slender species, allied to *P. dispar* Webster, but with much longer head and palpi, and longer and stouter caudal cirri. The head is nearly as long as broad, both the front and posterior edge a little produced in the middle; median antenna arising in advance of the center of the head, swollen toward the end, but with the tip acute, somewhat longer than the head, but scarcely reaching beyond the middle of the palpi; lateral antennæ very small, papilliform, nearly in line with the odd one. Ocelli four, the two pairs close together on the head, the anterior just outside of the lateral antennæ, the others just behind them. Palpi very long, more than twice as long as the head, at the base as broad as the head, slightly swollen, tapering gradually to the narrow end, the sides nearly straight or slightly incurved, slightly

emarginate at the tip, with a distinct sutural line along the middle above. Tentacular cirri small, papilliform. Parapodia small, each with a small dorsal and ventral cirrus and a large, obtuse, setigerous lobe. Setæ of several kinds, the usual arrangement being as follows: one or two acicula shorter than the other setæ, tapering, straight, spine-like, one usually acute and the other blunt at tip; one longer, slender, simple seta, curved and slightly enlarged toward the end, which suddenly narrows to a small acute tip; one, or sometimes two, of similar size and length, straight and abruptly expanded or spatulate near the end of the shaft, and bearing a long, very slender, acute, terminal piece; two or three unequal compound setæ, with the shaft spatulate at the end and bearing a short, acute-triangular, terminal piece. Posteriorly the lowest is a simple, curved seta, with a short, sharp tip, similar to the upper one, but shorter, more tapered, and less curved. The pharynx occupies about four segments; the median tooth is rather large. Stomach large, occupying two segments, oblong, with many circles of granules. Caudal cirri relatively large, elongated, enlarged in the middle, tapering to acute tips, their length greater than the diameter of the body, much longer than the median antenna. Color, pale salmon. Length, 5^{mm} to 7^{mm}.

Thimble Islands and Savin Rock, near New Haven, Conn., 2 fathoms, among algæ, and at low-water, among the débris attached to tubes of *Diopatra*, October, 1873, and October 15, 1875 (A. E. Verrill).

A specimen, probably a sexual form of this species or *P. dispar*, was taken in Vineyard Sound, at surface, July 10, 1875. It was similar anteriorly, but on the segments behind the 11th there were fascicles of long, slender setæ, twice as long as the diameter of the body. Color, yellowish green.

***Nereis alacris*, sp. nov.**

Body rather slender, slightly enlarged behind the buccal segment. Antennæ slender and pointed. First pair of superior tentacular cirri very long and slender, about equal to the first six segments; those of the second pair more than one-third longer, reaching about to the tenth segment; ventral cirri also long and slender, about one-third as long as the corresponding superior ones. Caudal cirri remarkably long and slender, longer and more slender than the longest tentacular cirri. General color of head and anterior segments bright olive-green; posterior segments and appendages tinged with orange-red; bases of antennæ and cirri tinged with purplish red; anterior eyes dark green with a red center, posterior pale red with a dark red center; middle of head pale green; a row of more or less connected and sometimes confluent light spots extends along the back, one to each segment; these spots are usually greenish white anteriorly, yellowish posteriorly. Smaller specimens are plainer colored, mostly greenish or brownish, often without dorsal spots.

Parapodia, in the middle region, of moderate size; upper rami longest, having an inferior and superior branchial lobe, or lingula, of about equal

length, the superior one somewhat gibbous and bearing the long, slender, dorsal cirrus beyond its middle; beyond the origin of the latter the lingula is lanceolate, subacute at the end; three conspicuous dark spots on the superior lingula, one terminal, one at the origin of the cirrus, the other midway between that and the body; another spot on the body, at base of the appendage. The inferior lingula is also lanceolate, a little shorter than the superior. More than half the length of the dorsal cirrus projects beyond the end of the lingula. The ventral lingula of the lower ramus is oblong-lanceolate, obtuse, considerably smaller than the dorsal one. Ventral cirrus small, slender, acute, not reaching to the end of the ventral lingula. Setæ in both the upper and lower rami of two kinds: in the superior fascicle of each they have slender, acute, terminal pieces; in the inferior fascicle the terminal piece is short and hooked at the tip. It is very active in all its motions, and swims rapidly. It constructs a tenacious tube, attached to algæ, and supported by divergent silken threads. Length, 2 to 3 inches.

Vineyard Sound, 8-10 fathoms, 1875. Described from life.

***Nereis megalops* Verrill.**

Nectonereis megalops Verrill, Report on Invert. of Vineyard Sd., etc., p. 298, [592], pl. xii, figs. 62, 63, 1873.

The female of this form was taken in Vineyard Sound, at surface, in 1875. Although agreeing in general with the male, it departs less widely from the ordinary *Heteronereis* form, both in respect to its head, palpi, and the dorsal parapodial appendages. The male has a simple, median, tapering, caudal cirrus. There are two minute, dark spots on each segment, along the middle of the ventral surface, posteriorly.

It is so nearly related to the *Heteronereis* stage of *Nereis Dumerili*, and to the *Heteronereis Malmgreni* described by Claparède, and to other related forms discovered on our coast by Professor Webster, that it seems probable that its *Nereis* stage, when known, will be closely allied to *N. Dumerili*, and consequently should be referred to *Nereis*, or to *Leontis*, if the latter be regarded as a distinct genus.

***Ceratocephale Websteri*, sp. nov.**

Head small, with the cephalic lobe emarginate in front, and with a median groove running back; sides slightly incurved; posterior margin slightly convex. No eyes. Antennæ small, slender, tapering, coalescent at base with the palpi. Palpi small, slender, bent somewhat downward, not much larger than the antennæ, the terminal joint small, subacute, about one-third the whole length. The four cephalic organs are similar in form, and all are directed forward. Tentacular cirri slender, acute; the dorsal ones of the two anterior pairs are longer than the others, being nearly twice as long as the diameter of the body; the ventral ones are bent downward and forward in life, and are less than half as long; of the two posterior pairs, the dorsal are somewhat longer than the ventral.

Buccal segment large, somewhat swollen. Jaws small, light brown, strongly curved, with slender, sharp tips, the edge moderately serrulate. Denticles (or paragnaths) not observed, the proboscis being retracted. Parapodia of anterior segments small, the two rami of nearly equal length, and with similar fascicles of setæ, the lower ones most numerous, the upper lingula small, subtriangular, terminated by the slender, tapering, dorsal cirrus, which, at about the fifth segment, is more than twice as long as the lingula and reaches about to the end of the setæ. Ventral cirrus short, tapering. Farther back, at the eleventh segment and beyond, the rami become more unequal, the upper lingula develops into a long, flat, narrow, tapering branchia, bearing the filiform dorsal cirrus at its tip. At the fifteenth segment and beyond the branchia is decidedly longer than the parapodia, curved directly upward, and about eight times as long as its width in the middle, and more than half the diameter of the body, rather abruptly narrowed at the tip, and terminated by the long, slender cirrus, which equals or exceeds the branchia. In the enlarged base of the branchiæ there is a circular, thickened, white, round spot, due to an internal organ. On the setigerous lobe of the upper ramus is a narrow-lanceolate, lingula-like process, extending from the setigerous lobe as far as the tips of the setæ. On the lower ramus there are two similar lingulæ, one of which is terminal, and the other is situated at about the distal third, on the lower side. Ventral cirrus small, slender, tapered, single on the first sixteen segments; on the seventeenth and subsequent segments there are two equal ventral cirri, arising close together. Setæ in this region form a large fascicle in each ramus, with a single aciculum dividing each fascicle into two groups. The setæ in the upper ramus have a very long, slender, smooth, nearly straight, terminal joint, flexible at tip, and not distinctly flattened, even toward the base. In the lower ramus, the terminal joint is not quite so long, slender, and narrow, but distinctly flattened, and with the edge very finely serrulate; these are very slightly curved, but not abruptly bent, near the base. Diameter of the anterior part of the body, 6^{mm} to 7^{mm} . Color of body pale brownish or pinkish; branchiæ and bases of parapodia bright red; setigerous lobes greenish, the setæ dark at base. Described from life.

Dedicated to Professor H. E. Webster, who has largely contributed to the knowledge of American Annelids.

Twenty-four miles east of Cape Cod, 122 fathoms, soft mud (U. S. Fish Commission). Only one specimen, which lacks the posterior portion of the body. Closely related to *C. Loreni* Malmgren, but the latter has the branchial organs cirriform and slender, and the double ventral cirri are figured upon the tenth segment; the setæ of the lower ramus are also represented with the terminal joint abruptly bent at base, wider, and much more strongly serrulate than in our specimen. It is possible, however, that the two may be only sexual forms of one species.

Lumbrinereis hebes Verrill.

Lumbriconereis obtusa Verrill, Proc. Amer. Assoc. for 1873, p. 383, 1874.

The name *obtusa* having been preoccupied in this genus, the above name is proposed as a substitute.

Goniada gracilis Verrill.

Eone gracilis Verrill, Report on Invert. of Vineyard Sound, etc., p. 302, 1873, (vol. i, Rep. of U. S. Com. of Fish and Fisheries, p. 596).

This species has upon its proboscis the two rows of V-shaped denticles (in chevron) and also the jaws as in *Goniada*, to which genus it should, therefore, be referred.

Polydora gracilis, sp. nov.

Small, 3^{mm} to 4^{mm} long, very slender. Antennæ stout, blunt, very long, six times as long as breadth of body, or even more, transversely wrinkled.

Head with a long, narrow, oblong, central portion, acute behind, notched or bilobed in front, with the two anterior corners rounded and a little prominent; side lobes of the head not broad, gradually narrowed toward the front; eyes four, the front pair conspicuous, decidedly larger and but little wider apart than the others, which are small and but little farther back.

The four anterior segments have small, rounded, dorsal papillæ, with capillary setæ; on the fifth there are fascicles of about six large special setæ, of which the posterior are shorter. On the sixth and following segments, there are, with the capillary setæ, three or four uncini in the dorsal fascicles. Branchiæ elongated, commencing on the seventh segment, absent on the twelve posterior segments. Caudal appendage sucker-like, with a smooth margin, surrounded by a marginal circle of dark specks. Color pale salmon or light flesh-color; antennæ and head with dark specks.

Off Block Island, 1873, gregarious in galleries in *Pecten tenuicostatus*, and having slender sand-tubes projecting from the orifices in the shell.

Polydora concharum, sp. nov.

A very long, slender species, having more than 200 segments, and often becoming four or five inches long.

Head, or cephalic lobe, narrow in front, projecting considerably beyond the wide lateral lobes (formed by the buccal segment), and deeply divided at the end into two lanceolate, acute, divergent lobes. Eyes four, small, but conspicuous, black, the anterior ones much wider apart than the posterior, and but little farther forward. In some specimens, the eyes are absent. Antennæ very long and slender, fifteen to twenty times as long as the diameter of the body, or more, whitish or pale flesh-color, with a central red vessel, and usually with a fine dark line on each side. Buccal segment large and swollen below, with longitudinal sulci extending back from the mouth. On the four anterior segments, the

parapodia, above and below, bear slender, very acute, bent setæ, and a prominent, flat process, somewhat expanded and rounded at the end; on the first segment, these are smaller and less spatulate, and the setæ are fewer and shorter. The fifth segment is about as long as the three preceding ones, not much swollen, and it bears three distinct groups of setæ, differing in form; the upper and most anterior are fine, bent, capillary setæ, with acute tips, similar to, but much smaller than, those of the preceding segments; below these there is a group of small, slender setæ, abruptly bent backward and with blunt tips; then there is a row of five or six large, strong, dark-colored, nearly straight, blunt spines, which are nearly equal in diameter, the anterior and upper ones longer, and, when projected at right angles to the body, forming an oblique, somewhat curved, transverse row; finally, in a row below the last of these, are two or three lighter-colored and more slender, straight spines, with abruptly tapered, acute tips. On the succeeding segments, the lower fascicles consist of strong, elongated uncini, in rows of six or seven, with the tip bidentate, strongly curved, beak-like, and with a thin, spatulate border; near the posterior end, they are replaced by acute setæ and fine capillary ones. The upper fascicles, on the segments behind the fifth, consist of numerous, long, bent, very acute setæ, like those of the anterior segments, the upper one in each fascicle with longer and more slender tips than the lower; toward the posterior end they become longer and fewer, with straighter tips, equalling or exceeding the diameter of the segments. Branchiæ appear in a rudimentary form as small papillæ on the sixth segment; on the seventh they are short conical papillæ; on the eighth they become longer and more distinctly ligulate, and increase in length on the following segments, soon becoming long and slender, recurved, and meeting across the back. They exist on one hundred or more of the succeeding segments. After the branchiæ cease the succeeding segments are very numerous, smaller, and rounder, so that the body is more slender and attenuated posteriorly, and somewhat broader and a little flattened on the branchiferous portion. Anal segment small, terminating in four small, roundish, equal, flattened lobes.

Color somewhat variable, usually pale flesh-color, or grayish or yellowish white anteriorly, and more or less tinged with dull greenish or brownish posteriorly, the red dorsal vessel showing plainly, and the branchiæ red. Length, 100^{mm} to 140^{mm}; breadth, 1^{mm} to 1.5^{mm}; length of antennæ, 20^{mm} to 30^{mm}. Described from life.

Very common all along the coast, from Cape Cod to Nova Scotia, in 10 to 100 fathoms, in tortuous, narrow galleries excavated in shells, especially of *Cyprina Islandica*; also in decayed wood dredged in 32 fathoms off Cape Cod. Collected by the writer in the Bay of Fundy in 1863, 1864, 1868, 1870, and subsequently at various localities while dredging for the U. S. Fish Commission in 1872, 1873, 1877, 1878, and 1879.

A new genus, related to *Spio*, but with a pair of branchial appendages behind the long antennæ, and with a distinct collar on the front edge of the second setigerous segment, was discovered near New Haven, Conn., at low-water, in 1877, and had been briefly described in this article. But learning that Professor H. E. Webster had also discovered the same genus, and had described it in a forthcoming paper on the Annelids of New Jersey, with an abundance of good specimens, my description has been withdrawn.

Spio limicola, sp. nov.

A small, slender species, with branchiæ on all the segments, and usually characterized by blackish, transverse lines and spots on the head and anterior segments. Body thickest anteriorly, tapering gradually to the end, somewhat depressed. Head flattened, obtusely rounded in front. Eyes four, small, nearly in a square. The anterior a little wider apart. Antennæ rather stout at base, tapered, blunt, about four or five times as long as breadth of body, whitish, with red vessels, and sometimes with thin, dark lines along the edges. Branchiæ flat, shorter, broader, and blunt anteriorly; narrower, longer, and more tapering farther back, where they meet across the back; posteriorly they become small and papilliform. The parapodia have anteriorly, in the upper ramus, two broad lingulæ, of which the posterior is the longer and more acute; the capillary setæ, arising between them, form large fascicles anteriorly; posteriorly they become longer, exceeding the diameter of the body, and form small fascicles. In the posterior region, the upper lingulæ become more unequal, the posterior one becoming elongated and the anterior one reduced to a mere papilla. The lower ramus is nearly the same on all the segments, consisting of a broadly rounded, flat, thick lobe, bearing a group of numerous uncini. Anal segment small, bearing four moderately long, blunt cirri, their length about twice the diameter of the anal segment.

Color, pale reddish white or light flesh-color, with bright red vessels and branchiæ, and showing the greenish intestine posteriorly; head with two blackish spots in front and others on the sides and beneath; anterior segments with blackish, transverse spots or interrupted lines of blackish between the segments on the ventral side and laterally; branchiæ and both upper and lower lingulæ usually with flake-white specks or a white line along their margins; anal segment and cirri greenish yellow.

Length, 25^{mm} to 35^{mm}; breadth, 1^{mm} to 1.5^{mm}. Described from life. Cape Cod Bay, 16 to 25 fathoms, soft, fetid, sandy mud (U. S. Fish Commission, 1879). Some of the specimens were filled with pink eggs, August 29.

Spiophanes tenuis, sp. nov.

A very delicate and slender species, thickest anteriorly at the branchial segments, gradually attenuated posteriorly. Head changeable,

depressed, narrow in middle, expanding laterally at the front, with prominent, blunt, lateral angles, and with a broadly rounded or sometimes slightly emarginate front margin; posteriorly the narrow head-lobe extends back to the second setigerous segment. Eyes four, minute, in a quadrangle, the anterior pair wider apart. Antennæ slender, not very long, about three times as long as diameter of body. Buccal segment swollen, forming short, convex, lateral lobes along the posterior half of the head; below the mouth is a prominent, strongly ciliated lobe. Branchiæ in four pairs, on the 2d, 3d, 4th, and 5th setigerous segments; the anterior pair branched, the others apparently foliaceous and shorter.* The first setigerous segment has a small, prominent, rounded, upper ramus, with few short setæ. The 2d to 5th have a broad linguliform, or leaf-like, upper ramus, with the inner distal edge prolonged into an angle over the back, and a very broad, fan-shaped fascicle of long acute setæ set transversely and protecting the gills; a smaller lobe also exists in front of the setæ; lower ramus composed of a small, rounded lobe with a fascicle of slender setæ, and with uncini in the fascicles beyond the 15th segment, and a cluster of acute setæ. The parapodia increase rapidly in size from the 1st to the 6th, and then gradually decrease to the 17th segment, beyond which they are rudimentary; on the 5th to 8th the upper lingula is about half as long as the breadth of the body; beyond the 5th they are more or less expanded distally, or wide, spatulate, bluntly terminated; beyond the 10th small, not very prominent, rounded; on 5th to 10th segments the upper setæ are slender, acute, longer than the lingula, and in large fascicles, though in much smaller ones than those of the branchiferous segments; on the posterior segments the uncini become longer, and the capillary setæ mostly disappear in the lower fascicles. Color yellowish or greenish white, often decidedly greenish posteriorly, and with a dark greenish-yellow intestine. Some were filled with pale pink eggs, August 29.

Cape Cod Bay, 16 to 21 fathoms, soft, foetid mud (U. S. Fish Commission, 1879).

***Heterocirrus fimbriatus*, sp. nov.**

A delicate species, remarkable for the great length and slenderness of its setæ, which form a wide fringe along the sides of the body. Head small, about twice as long as broad, not half as broad as the body, obtusely rounded in front, with a pair of sublateral ocelli at about the anterior third. Tentacular cirri short, usually absent in preserved specimens. The three to six anterior segments bear each a pair of slightly

* A larger specimen was taken in 31 fathoms, off Cape Cod, which may be a distinct species. In this the branchiæ are long, lanceolate, acute, and all are pectinately divided along the posterior margin, with slender papillæ. The eyes are red. Proboscis urceolate, with the extended margin scalloped. The first eleven segments bear capillary setæ, above and below, in large fascicles; on the 12th to 16th there are also stouter acute spinules in the lower fascicles; beyond the 16th segment there are uncini mingled with the capillary setæ.

clavate, unequal, branchial cirri, mostly less than four times as long as the diameter of the body. The two anterior segments have slender capillary setæ in the upper fascicles, less long than the diameter of the body; they increase in length and numbers farther back, and on the seventh and forty to fifty succeeding segments they become very numerous and remarkably long, being from two to three times as long as the breadth of the body; toward the posterior end of the body they again diminish in length, becoming comparatively short on the last twenty segments. The ventral setæ are all capillary and fine-pointed on the anterior and median segments; they somewhat exceed the diameter of the body in the middle segments, but are shorter toward both ends. On the last twenty segments there are, in each ventral fascicle, one or two short unciniiform setæ with somewhat hooked but scarcely bidentate tips. Similar unciniiform setæ exist in some of the posterior dorsal fascicles. The setæ are silvery white. Body dark olive-green, with lighter dorsal line; branchiæ with dark tips. Length, about 25^{mm}; diameter, without appendages, 1^{mm} to 1.75^{mm}.

Off Campo Bello Island, Bay of Fundy, 60 fathoms, burrowing in dead shells of *Pecten tenuicostatus*, 1872.

Dodecaceria concharum (Ersted).

This species is nearly allied to the last, and occurred with it. It is very common, on our coast, in various shells. The genus *Dodecaceria* Ersted has not been distinctly distinguished from *Heterocirrus* Grube, to which it is closely related. The number of branchial cirri is variable in both, but their arrangement is the same. The setæ, however, are different in their arrangement. In *D. concharum* the 1st segment bears no setæ; on the 2d to 7th there are short capillary setæ, above and below; on the 8th there is a solitary, long, unciniiform seta in the dorsal fascicle of capillary setæ, and four or five stouter ones, with bidentate tips in the ventral fascicles, and no capillary ones; on the 9th and succeeding segments, the ventral setæ continue as on the 8th, and the dorsal fascicles usually contain four or five elongated, simple, hooked uncini, together with more or less numerous fine, acute, capillary setæ, which are often absent, but they occur on some of the segments even to the posterior end, where they are often about one-third as long as the diameter of the body. Behind the middle of the body the uncini become smaller, shorter, and fewer, only two or three to a fascicle, but near the posterior end, on four or five segments, they become stouter, more hooked, and distinctly bidentate, especially on the ventral side.

The color is usually dark green or greenish black, and no distinct ocelli were detected, but some obscure dark specks may represent them.

Praxillura, gen. nov.

Body very long and composed of a larger number of segments than is usual in the *Maldanida*. Posterior segments very numerous, short, becoming indistinct posteriorly. Caudal segment subacute, destitute of

a funnel, and, in our specimens, of any other appendage. Anterior segments numerous and short, eight or more (in the type), bearing, in the lower rami, one or two simple, acute spines; in the middle and posterior regions bearing a row of uncini. Head gibbous posteriorly, without any well-marked lateral fold.

Praxillura ornata, sp. nov.

Body very long, slender, of nearly uniform diameter, composed of about forty setigerous segments; the eight anterior bear only one or two spines in the ventral rami, uncini appearing on the 9th. Head swollen and gibbous above, posteriorly, abruptly flattened in front, with the anterior edge bluntly rounded; two rounded, lateral lobes beneath; front concave beneath; no distinct lateral lobes above; numerous small, red ocelli in several rows around the front margin. Buccal segment thick, coalescent with the head, long, biannulate, the head and buccal segment together about equal in length to the first two setigerous ones. The eight anterior, setigerous segments are short, scarcely longer than broad, with a well-marked suture between, and biannulate, the posterior half smaller, the anterior swollen in the middle, where the setæ arise, and with a red band behind the setæ. In the middle region, the segments are long and narrow. The seven or eight anterior segments have a small upper fascicle of slender acute setæ, and one stout acute spine below (sometimes two). On the ninth segment * there are two uncini and a spine below them; and on the tenth to the twelfth and several following there are four to eight uncini, and the number increases farther back. The last seventeen setigerous segments are very short. These are followed by several scarcely distinct segments at the posterior end, which is tapered and simple. Color pinkish white, with a bright red band on each segment anteriorly, a dark red spot on each side of the head, and two bands of red on the buccal segment. Ocelli red. On the middle region, the bands are less distinct, and the surface is covered with dark brown specks. Length, 125^{mm} to 150^{mm}. Diameter, 1^{mm} to 1.5^{mm}. Described from life.

Off Race Point, Cape Cod, 25 fathoms, sandy mud, in long, round, rigid tubes, made of fine sand (U. S. Fish Commission, 1879). Casco Bay (U. S. Fish Commission, 1873).

Maldane filifera, sp. nov.

Very slender, elongated, with twenty-one setigerous segments, of which fifteen elongated ones are included in the middle region, three short ones are anterior, and three short ones posterior. The head is swollen, convex, and gibbous at the posterior part, abruptly flattened in front, with the front edge bluntly rounded; a low lateral fold; buccal segment coalescent with the head. The three anterior setigerous segments are short, about as long as broad, with a fascicle of long, acute

*In one specimen there are four, somewhat unciniiform, ventral spinules, in a row, on the eighth segment, and more on the ninth, without the acute spinule below.

setæ above, and a row of about three spines below; on the fourth and fifth segments there are six to nine uncini in the row, and more farther back, where they become prominent, strongly hooked, or claw-like uncini. The fourth and several succeeding segments are usually more than twice as long as broad, with an annulation in front of the middle; farther back, in the middle region, the segments are six to eight times as long as broad, very slender, swollen near the posterior end, where the setæ arise. The last three setigerous segments are about as long as broad, swollen in the middle, and bear slender setæ about one-half as long as the breadth of the body, and a row of uncini. Anal segment consolidated with the preceding, apparently single, non-setigerous one, very obliquely truncated at the end, and surrounded by a well-developed, smooth border, interrupted dorsally, so that when expanded it has a spatulate form. The anal opening appears to be nearly central, within the border. The caudal membrane is filled with blood-vessels. In the middle region of the body, on the ninth to eighteenth segments, in the upper fascicles of acute setæ, are two very long, slender, flexible, thread-like setæ, usually unequal, the longer six to eight times as long as the diameter of the segments; they are covered with sharp spinules, alternating on the two sides. Color of middle segments salmon, thickly specked with orange-brown and reticulated with red blood-vessels; anterior and posterior segments greenish or yellowish white.

Off Cape Cod, 20 to 50 fathoms, in hard sand; tubes attached to valves of dead bivalves (U. S. Fish Commission, 1879).

Notomastus gracilis, sp. nov.

Very small and slender. Head moderately acute in extension. Six anterior segments bear fascicles of capillary setæ above and below; the seventh and succeeding segments bear uncini above and below, but in the lower fascicles of the seventh segment there are often some capillary setæ also. The fascicles are all small. The uncini are elongated, distinctly constricted toward the end, and expanded in a blade-like form beyond, with the tip only slightly hooked. Color red. Length, 40^{mm} or more; diameter, 0.05^{mm}.

Noank, Conn., 4 to 5 fathoms, mud (U. S. Fish Commission, 1874).

This species resembles *N. filiformis* Verrill, but differs in the form and arrangement of the setæ. In the latter, the five anterior segments bear large groups of long, capillary, acute setæ; but on the fifth there are sometimes a few uncini mingled with the capillary ones in the lower fascicles. The uncini are numerous on the following segments, and are long and somewhat bent, but show no constriction, the distal portion being regularly narrow, spatulate, or paddle-shaped, with the central shaft curved, blunt, and slightly hooked at the tip. In some specimens there are two well marked black eyes. The tip of the head is elongated and acute.

The genus *Ancistria* Quatrefages would include both the above species, but it seems to be impossible to distinguish that genus by any defi-

nite structural characters from *Notomastus* Sars. Therefore, the two species formerly described by me from Casco Bay as *Ancistria capillaris* and *A. acuta* should be named *Notomastus capillaris* and *N. acutus*.

***Polycirrus phosphoreus*, sp. nov.**

A large, handsome, bright red species, remarkable for its brilliant violet-blue phosphorescence when disturbed.

Body very changeable in form, soft and flaccid, usually swollen anteriorly, narrowing somewhat near the head, and more attenuated posteriorly. Tentacles very numerous, originating from an elongated and somewhat spatuliform cephalic process. Fascicles of acute, capillary setæ exist on twenty-four segments. The uncini commence on the tenth setigerous segment. They are minute, strongly hooked, and form a linear row, consisting of about twenty on the tenth segment, and of thirty to forty on the succeeding ones. The posterior region not having capillary setæ consists of thirty or more segments, toward the end becoming very short and indistinct. Anal segment small, simple, with a minute papilla. Ventral glandular shields conspicuous on the nine anterior segments, covering the whole ventral surface, becoming narrower backward, and bilobed; beyond the ninth segment the ventral shields are smaller and more distant, squarish, bilobed, and separated by a median furrow. On the nine anterior segments there is also a thickened, annular, light-colored, glandular area, just below the fascicles of setæ; farther back these become rudimentary. Color bright red or blood-red. In August, females were filled with large quantities of light red ova. Length, up to 75^{mm} to 80^{mm}; greatest diameter, 4^{mm} to 5^{mm}. Described from living examples.

From off Stonington, Conn., to the Bay of Fundy, in 10 to 50 fathoms. Common in the Bay of Fundy, where it was collected by the writer in 1863, 1864, 1868, 1870, 1872. Casco Bay and Massachusetts Bay (U. S. Fish Commission).

***Trichobranchus glacialis* Malmgren.**

In life, the anterior part of the body is swollen, bright red, brightest near the head on the dorsal side. Posterior portion of body slender, yellowish or greenish. Lip and cephalic lobe bright blood-red anteriorly. Below the mouth is a turgid fold, which is light red, crossed by longitudinal lines of bright red. Tentacles whitish, those in front clavate or spatulate, the posterior ones very numerous, slender, filiform. Branchiæ slender, cirriform, in length about equalling the diameter of the body.

Off Cape Cod, 122 fathoms, soft mud (U. S. Fish Commission, 1879).

***Spirorbis Stimpsoni*, sp. nov.**

Spirorbis nautiloides? Verrill, in former papers. See Trans. Conn. Acad., vol. iii, p. 45, pl. iv, fig. 4 (*non* Lamarck).

Tubes dull white, opaque, terete, rather closely coiled, the aperture not raised; surface somewhat rough with the lines of growth, often

smoothish. Branchiæ nine, rather long, lanceolate, with slender, naked tips and numerous lateral processes. Operculum elongated obconic, hollow, containing the eggs; pedicel slender at base, enlarging gradually to the operculum.

Massachusetts Bay to Nova Scotia, common, in 10 to 80 fathoms, on shells and stones.

Tomopteris Smithii, sp. nov.

A large and very elegant species, remarkably transparent and exceedingly active in its motions. Outline, including lateral appendages, elongated oval or lanceolate, the length being about three and one-half times the breadth. Head with two small eyes, near together; two short, tapering, acute antennæ, and two very long and slender cirriform processes, nearly half as long as the body; these originate from broad subconical bases. The lateral appendages of the body commence close to the head; the first are about equal to the diameter of the body, but those at about the anterior third are twice as long, while the posterior ones become very small and more distant; the tail ends in a narrow, naked portion, of considerable length. The lateral appendages taper from the base to the fork, where they divide into two lobes, each consisting of a broad, elliptical, and very thin membrane, supported by an acute central branch of the main stem. The naked caudal portion in one specimen had about six faint bands of reddish, not seen in the other; all other parts are so limpid as to be nearly invisible in clear water. The interior of the body and appendages contained numerous eggs. Length, 63^{mm} and 70^{mm}; breadth across appendages, 18^{mm}; length of middle appendages, 7^{mm}; of long cephalic appendages, 29^{mm}.

Eastport, Me., August, 1872, two specimens, at surface. Named in honor of Professor S. I. Smith, who first discovered it.

GEPHYRÆA.

Priapulys pygmæus, sp. nov.

A small yellowish white or flesh-colored species. In extension the proboscis is usually slightly clavate, nearly as long as the body, and often somewhat greater in diameter. The proboscis is distinctly longitudinally marked with about twenty-five white, muscular lines, between which there are as many rows of small, prominent, conical papillæ, largest toward the mouth and disappearing on the posterior third. Body usually cylindrical, changeable, abruptly tapered or subtruncate at the posterior end, distinctly annulated, with fine circular and longitudinal lines on the annulations; at the posterior end having very small conical papillæ on the annulations. Caudal appendage in length about equal to diameter of body, with a rather stout stem, bearing about twelve short, fusiform papillæ or branches, which are changeable in form, and covered with small conical papillæ. The integument is so translucent that the corpusculated circulating fluid can be easily seen circulating in the hollow stem and tubercles. The corpuscles are minute and round.

Pharynx provided with numerous teeth in longitudinal rows, each with a whitish, slightly curved, acute, central denticle. Intestine brown, scarcely longer than the body. Proboscis whitish or pale flesh-color; body and caudal appendage yellowish. Largest seen were about 15^{mm} long and 2^{mm} in diameter. Described from life. The form of the body and proboscis continually changes.

Massachusetts Bay, off Plymouth, 27 fathoms, soft mud; Harbor de Luth, Campo Bello Island, Bay of Fundy, 4 to 5 fathoms, soft mud (U. S. Fish Commission, July 30, 1872).

Thalassema viridis, sp. nov.

A small bright green species with swollen body and long slender proboscis, somewhat spoon-shaped at the end. Body round, thick, about twice as long as broad, largest and obtusely rounded posteriorly; the surface is minutely granulous in appearance, the granules in circular lines; anteriorly the body rapidly narrows to the base of the proboscis, where there are two small spines at the mouth. The proboscis is so infolded at the edge as to form a groove, like a spout, which expands near the end; it is longer than the body. Color bright grass-green. Length of body, about 6^{mm}. Described from life.

Off Head Harbor, Campo Bello Island, 77 fathoms, mud, 1872. Found in holes in hard nodules of blue clay.

NEMERTINA.

Amphiporus virescens, sp. nov.

Body long, slender, tapering gradually to the tail, widest anteriorly in extension. Active in its movements. Head ordinarily obtusely rounded in front. Ocelli numerous, forming a very long lateral cluster on each side of the head; anteriorly each cluster consists of several rows, but it narrows backward to a single row, which extends back beyond the head and neck. Color clear pale green, varying in tint. Length of largest specimens seen, about 40^{mm}.

New Haven and Noank, Conn.; Wood's Holl, Mass., etc. Common among hydroids on the piles of wharves.

Amphiporus agilis Verrill (= *Ophionemertes agilis* Verrill, Am. Jour. Science, vii, p. 45, pl. 7, fig. 1).

This species belongs to *Amphiporus*, as characterized by M^rIntosh. It has only been taken in 20 to 90 fathoms, off the coast of Maine.

Amphiporus roseus Verrill (= *Planaria rosea* Müller).

The species which I thus identify is common in Massachusetts Bay and the Gulf of Maine, on muddy bottoms, in 20 to 100 fathoms. It agrees well with the original figures and descriptions, but does not agree with *A. pulcher*, to which M^rIntosh refers Müller's species, erroneously it seems to me. The color above is usually deep cherry-red to reddish brown, varying toward orange and chocolate-brown; beneath, flesh color.

Ocelli in two large clusters on each side of the head, the anterior groups largest, somewhat triangular, covering the antero-lateral margins and extending upward and backward on the head, where they terminate on each side in a small subdorsal group of ocelli, more distinct than the rest; just back of these are two distinct clusters of ocelli. Transverse fossæ run up on each side, in line with the posterior groups of ocelli. Proboscis large, finely papillose, reddish. Length, 50^{mm} or more.

I have also met with another species, which agrees nearly with *A. pulcher*, as described by McIntosh, and with which it is probably identical.

Amphiporus Stimpsoni Verrill (= *Onomatoplea Stimpsoni* Girard, in Stimpson).

This is very common in Massachusetts Bay and northward to the Bay of Fundy and Labrador, from low-water mark, under stones, to 100 fathoms. It is easily recognized by its clear, dark purplish or chocolate-brown color above, with pale margins and a squarish or triangular white spot on each side of the head, and usually with a narrow white band across the neck; beneath, pinkish or flesh-color. Ocelli in two or more rows in an elongated group on each antero-lateral margin of the head, and a pair of small subdorsal clusters on the transverse white nuchal band. Often 150^{mm} long and 8^{mm} to 10^{mm} broad.

The *Planaria angulata* of Otho Fabricius was probably based on this species; but his description is insufficient to determine this with certainty.

Amphiporus lactifloreus McIntosh.

Common at Eastport, Me., under stones, at low-water mark. Its color there is usually pale flesh-color, or dull whitish or grayish. Length, 50^{mm} to 100^{mm}.

Amphiporus cruentatus, sp. nov.

A species peculiarly characterized by having red blood, so that the vessels appear distinctly red through the translucent integument. Body flaccid, versatile, slender, tapering to both ends; head not very distinct; snout strongly ciliated. Ocelli about 12 on each side of the head, in an interrupted longitudinal row, the most anterior one considerably larger. Two slight transverse grooves on each side of the head, apparently not extending across the dorsal side, but the anterior ones curve forward in front of the ganglia, and the posterior ones behind the ganglia. Proboscis long, densely covered with elongated, conical papillæ. A simple central stylet and two small lateral ones on each side. Color light reddish salmon, with conspicuous bright red median and lateral blood-vessels, containing a corpusculated red fluid.

Vineyard Sound, 4 to 5 fathoms, July 21, 1875.

Tetrastemma vermiculus Ehr. (?): McIntosh.

This species, as determined by McIntosh, was common on the piles of wharves at Gloucester, Mass., in 1878. Color pale grayish or yellowish,

usually with more or less distinct brownish mottlings along the sides, due to internal organs. The two pairs of ocelli are rather distant, and usually there is a dusky line extending between the two eyes of the same side. On the head, in front of the eyes, there are often flake-white specks; and frequently others occur along the middle of the back. Not before recorded from the American coast.

Tetrastemma vittata Verrill.

American Journal of Science, vol. vii, p. 45, pl. 7, figs. 3, *a, b*, 1874; Proc. Amer. Assoc. for Adv. of Science for 1873, p. 389, pl. 2, figs. 7, 8, 1874.

Cosmocephala (?) *cordiceps* (Sars, MSS.), Jensen, Turbellaria ad Litora Norvegiæ, p. 82, tab. viii, figs. 13-16, 1879.

The species described by Jensen from the coast of Norway agrees so well, in form and color, with our *T. vittata*, as to render its identity highly probable. The eyes were not observed by Sars in the Norwegian specimens, but they are often so obscured by the very dark color of the head, in our darkest examples, as to be almost invisible.

This species was dredged in considerable numbers this season in Cape Cod Bay, 16 to 22 fathoms, mud, by the U. S. Fish Commission. Some of the specimens were 3 inches long.

Lineus viridis Verrill (= *Planaria viridis* Fabr.).

Lineus Gessereusis M'Intosh.—*Nemertes viridis* Verrill, Report on Invert. of Vineyard Id., etc., p. 334 [628].

This species is exceedingly abundant on our coast, from the Arctic Ocean to Long Island Sound. It occurs gregariously under stones, between tides, and also at the depth of several fathoms. The most abundant variety is green, varying from dull olive-green to greenish black, the anterior end usually darkest, and the ventral surface paler than the back. The transverse light lines are usually indistinct. Length, often 150^{mm} or more.

Var. **fusca** (= *Planaria fusca* Fabr.).

This variety occurs like the last, and is usually associated with it. The color varies from pale reddish brown to dark brown and greenish brown.

Lineus communis Van Beneden.

This species, accurately described and figured by Van Beneden, is very common, often occurring in large groups under stones and among muscles, on muddy shores, between tides (Eastport, Me., to Long Island Sound). It much resembles the preceding species in form and color, but is more slender, with a more elongated head, the mouth being farther back. The color is usually dark olive-green to greenish black, but varies to brownish and dull reddish. Ocelli black, often rather indistinct in dark specimens, forming a single lateral row on each side of the head. It is probable that *L. socialis* (Leidy sp.) is not distinct from this.

Lineus dubius, sp. nov.

Similar to the last in form and habits. Body very slender in extension, and attenuated posteriorly. Head elongated, narrow. Ocelli *white*, inconspicuous, forming a simple lateral row of about twelve, extending back on each side of the head, beyond the lateral (nasal) fossæ. Color light green to dark olive-green. Length of largest observed, 50^{mm} to 75^{mm}.

Gloucester, Mass., under stones, between tides, 1878.

Lineus pallidus, sp. nov.

Long and very slender in extension, subterete, attenuated posteriorly. Lateral (nasal) fossæ long and deep. Mouth situated far back. Head elongated, usually obtuse and wider than the body, but very changeable. Ocelli absent. Color usually whitish or pale ocher-yellow, becoming reddish toward the head, and with a rather indistinct paler dorsal line; anteriorly there are usually two pale dorsal spots, in front of which the head is yellowish. Length, in extension, 100^{mm}; breadth, 0.5^{mm} to 0.75^{mm}.

Off Cape Ann, Mass., 45 fathoms, mud, 1878.

Micrura affinis V. (= *Polia affinis* Girard, in Stimpson).

This species is very common from Massachusetts Bay to the Bay of Fundy, in 10 to 100 fathoms, on hard bottom. It is usually bright clear red or reddish brown above, rarely varying toward dark olive-green; beneath, pinkish white; front of head with a white margin running back in a short median point. Ocelli black, several in a single row on each margin of the head, the front one largest, variable in number. Caudal filament slender, acute, white. Length, often 125^{mm} to 150^{mm}; breadth, 2^{mm} to 4^{mm}.

Micrura inornata, sp. nov.

Body subterete, moderately elongated, thickest anteriorly, gradually tapered to the somewhat flattened tail; caudal filament white, very slender and acute, sometimes as long as the diameter of the body, but usually less. Head obtuse, often as wide as the body or wider. Lateral fossæ deep, extending to opposite the mouth, the latter not being very far back. No ocelli. Color bright cherry-red, varying to dark red, the middle of the head brightest; tail pale. Length of largest specimens observed, about 75^{mm}; breadth, 0.10^{mm} to 0.12^{mm}.

Massachusetts Bay and Gulf of Maine, 45 to 110 fathoms, mud. Resembles the young of *Cerebratulus luridus* V., which occur with it.

Micrura albida, sp. nov.

Body thickest and nearly round anteriorly, tapered and somewhat flattened posteriorly, with a small, slender, caudal filament. Head obtuse, narrower than the body. No ocelli. Lateral fossæ short, not conspicuous. Color whitish or pale yellowish, often becoming light red toward the head; posteriorly often with grayish or clay-colored internal mottlings along the sides. Very sluggish in its motions. Two specimens from

140 fathoms, apparently of the same species, had a narrow ring of blue around the body, behind the head. Length, 50^{mm} to 100^{mm}; diameter, 2.5^{mm} to 3^{mm}.

Common in the Gulf of Maine and Massachusetts Bay, on muddy bottoms, in from 30 to 140 fathoms.

NEMATODA ?

Nectonema, gen. nov.

Body long, slender, nearly round, smooth. Head without appendages, obtusely rounded or blunt-conical, apparently with the mouth on the under side. Along each side of a considerable part of the length of the body, posteriorly, there is a delicate fin, composed of very numerous, slender, hair-like processes, apparently in two close alternating rows (perhaps in life connected together by a delicate web). In the supposed male, the tail is more or less incurved, tapered to a small papilliform tip. No external sexual organ visible. In the larger form, regarded as female, the posterior end is subtruncate, with a small terminal papilla.

Nectonema agilis, sp. nov.

A long, slender, and exceedingly active, round worm, resembling a *Gordius*, found swimming at the surface with a rapid, eel-like, undulatory motion. Integument firm, opaque, generally smooth, but with minute, oblong, brown verrucae posteriorly. Body, in life, nearly round, slightly flattened on two sides, of nearly uniform size throughout, but slightly tapered close to the somewhat smaller, depressed, obtusely conical head, and somewhat more gradually tapered to the posterior end in the male. The peculiar fins are generally more or less injured, even in life, so that their real length is difficult to determine; but they appear to occupy half the length of the body, and perhaps more. In life they appear to have a continuous web, binding the hair-like rays together, but whether it was anything more than mucus is uncertain. The fin-rays, in length, are more than half the diameter of the body. Owing to the opacity of the integument, little could be seen of the internal structure without dissection or the preparation of transverse sections, for which no suitable opportunity occurred. In the head, which is more translucent, there appeared to be four roundish bodies, visible by transmitted light, while a transverse whitish band behind these seemed to indicate the position of the mouth. At the posterior end there seemed to be an anal opening, and a straight intestine leading to it. In some female specimens, a central whitish line, due to an internal organ (intestine?), could be traced from the head to the extreme posterior end, and a yellowish white organ (ovaries?), with numerous transverse divisions, extending from near the head to the tail, could be indistinctly seen. Color, in life, grayish or yellowish white, with four narrow, double, longitudinal lines of dark slate-color. Length, 80^{mm} to 200^{mm}; diameter, 0.5^{mm} to 1^{mm}.

Vineyard Sound, Mass., swimming actively at the surface in the

evening. June and July, 1871, and July, 1875. First observed by Professor S. I. Smith.

This species was referred to as an "Undetermined Genus" in my Report on the Invertebrata of Vineyard Sound, etc., p. 632, 1873.

POLYZOA.

Alcyonidium rubrum, sp. nov.

An encrusting species, forming broad, smooth colonies, covering stones and large shells. Zoœcia rather large, mostly hexagonal, but often pentagonal, with their boundaries well-marked in alcoholic specimens by a distinct line. The retracted zooids in preserved specimens usually form a small papilla in the middle of the zoœcia. Color, in life, bright brick-red, or sometimes orange-red.

Common all along the coast, from Long Island Sound to Nova Scotia, mostly in 10 to 50 fathoms, and especially on *Pecten tenuicostatus*.

Bugula cucullata Verrill, Amer. Jour. Sci., xviii, p. 52, July, 1879.

Zoarium much branched, branches slender, dichotomously divided, the branchlets diverging but little. Zoœcia in two alternating rows, rather large, elongated, narrow, with the long, narrow, frontal area occupying most of the length. At the distal angles there are usually two rather long slender spines on each side, but often three on the outer angle. The spines are unequal, divergent, more or less curved and directed upward; the one farthest in front is usually longest, curved forward and upward at base. Avicularia large, elongated, the length greater than the width of the zoœcia, situated rather in advance of the middle of the outer margin of the frontal area, the beak reaching beyond the distal end of the zoœcia; the head is compressed, broad-oval, and tapers below at the posterior end into the pedicel, which is thick at first, but narrows to a slender base; the beak is long, concave above, but strongly incurved or hooked at the tip. Oœcia short, but wide, nearly hemispherical, the front edge turned upward, showing a large opening in a front view, and giving them a hood-like appearance; surface more or less areolated, glistening.

Jeffrey's Ledge, off Maine, 51 fathoms, taken by Dr. A. S. Packard and Mr. C. Cooke, while dredging on the "Bache," in 1874, for the Fish Commission. A second specimen of this fine species was dredged this season, off Cape Cod, in 75 fathoms, mud. When placed in alcohol, it quickly became bright rose-red; but the alcohol soon dissolved the color, becoming light pink, while the specimen became white.

Bugula decorata Verrill, Amer. Jour. Sci., xviii, p. 52.

Zoarium rather large, with thick, much branched stems, producing densely branched, somewhat plumose tufts, two inches or more high. Branches unequally dichotomous, often somewhat spirally arranged. Zoœcia in two alternating rows, large, broad, prolonged proximally. Frontal area large, elongated, sunken and wrinkled in the dry state.

The distal angles are prolonged into a single, stout, often short spine on each side, frequently absent on the inner angle. Avicularia on the middle of the front side of the zoëcia, toward the base; they have a short, broad, swollen head, with a short, strongly curved beak; the pedicels are short and thick, rapidly enlarged from the base upward. Oëcia large, globose, brilliantly iridescent, elegantly sculptured, with a series of raised curved lines passing up over each side and converging to the middle of the front side, while their concave interspaces are covered with microscopic transverse lines. Dredged at Eastport, Me., by the writer, and also in the Gulf of Maine, 110 fathoms, near George's Bank, by Dr. A. S. Packard and Mr. C. Cooke, in 1872 (U. S. Fish Commission).

The other species of *Bugula* found on the New England coast are as follows:

Bugula turrita (Desor) Verrill. Florida to Casco Bay.

Bugula avicularia (L.) Oken. Long Island Sound to Spitzbergen; Europe.

Bugula flustroides (Lamx.) (= *B. flabellata* Gray). Long Island Sound to Maine; Europe.

Bugula fastigiata (L.) Alder (= *B. plumosa* Busk). Massachusetts Bay to Labrador; Europe.

Bugula Murrayana Busk. Long Island Sound to Spitzbergen; Europe.

B. Murrayana, var. *fruticosa* (Packard). Massachusetts Bay to Spitzbergen.

Bugula flexilis Verrill* and *Bugula umbella* Smitt belong to the genus *Kinetoskias* Dub. and Koren. Both occur in deep water off Maine and Nova Scotia.

Bugulella fragilis Verrill (Amer. Jour. Sci., xvii, p. 472, June, 1879).

A peculiar genus, in which the branches are composed of a single series of cells, connected together by small and short joints. Zoëcia with an oval frontal area, surrounded by spines.

Off George's Bank, 220 fathoms, on *Acanella*.

CELLULARIDÆ.

Notwithstanding the very numerous restrictions which the ancient genus *Cellularia* has undergone, it is still made to include heterogeneous species by several recent writers, while others restrict it to groups not originally included by Pallas. In the excellent memoirs of Smitt on the Arctic Bryozoa, five species still remain in the genus *Cellularia*. These belong, however, to three well-marked groups, some of which have received several generic names, so that their synonymy is very complicated. Having had occasion to revise this family, I offer the following summary, so far as it concerns the New England species.

* See American Jour. Science, ix, p. 415, pl. 7, fig. 1, 2, 1875; and vol. xvii, p. 259, 1879.

- I. *Cellularia* Pallas, 1766, (restricted). Zoëcia unilateral, in two alternating rows, mostly protected by lateral spines, either simple or dilated. Vibracula and lateral and median avicularia present. Type *C. scruposa*.*
- a. Subgenus *Cellularia* (= *Scrupocellaria*, pars, Gray, Busk). Lateral spines all simple.
- b. Subgenus *Cellarina* Van Ben. (incl. *Tricellaria* Flem., 1828). One of the lateral spines usually more or less dilated and often expanded in a shield-like form in front of the zoëcia. Two New England species: *C. scabra* Van Ben. and *C. ternata* (Sol.), with varieties *gracilis* and *duplex* (Smitt).
- The name *Tricellaria* (given to *ternata*) might have been adopted for this subgenus, but it is very inapplicable to the group, and even to the type-species, as now known.
- II. *Scruparia* Oken (restricted) (= *Scrupocellaria*, pars, Gray; *Canda* Busk, non Lamx.). Lateral avicularia and vibracula absent. A lateral spine develops into a protective (often frondose) shield. Type *S. reptans* (Linné), not yet found on the American coast.
- III. *Bugulopsis* Verrill (= *Cellularia*, pars, Busk, non Pallas). Characterized by the simple, unarmed zoëcia, arranged in alternating rows, and destitute of avicularia, vibracula, and shields. Type *C. Peachii* (Busk), Gulf of Maine and Bay of Fundy. European seas, north to Spitzbergen.

As no species of the last group was originally included in *Cellularia*, it is inadmissible to restrict that name to it. Either *reptans* or *scruposa* should be taken as the type of *Cellularia*, both having been originally included by Pallas, as well as by most subsequent authors. *Scruparia*† Oken (1815) originally included not only the group that had previously been named *Eueratea* by Lamouroux (1812), but also *S. reptans*. Therefore there seems to be no good reason why it should not be restricted, as above, rather than be displaced by the much later and more objectionable name, *Scrupocellaria*. *Menipea*, used by Busk and others for *Cellarina*, is inadmissible, in that sense, for the original group named *Menipea* by Lamouroux is a valid and very distinct genus. *Canda* (Lamx., 1816), adopted by some for *Cellularia reptans*, cannot properly be so used, for the original type is a distinct genus.

Porellina stellata Verrill, Amer. Jour. Sci., xviii, p. 53.

A large species, forming radiating patches on shells, etc. Zoëcia arranged in quincunx, large, broad, moderately convex, white, shining, mostly imperforate and smooth, the marginal ones more or less perforate in front. Apertures nearly semicircular, the proximal edge straight or nearly so, often with two spines on the distal border; median pore, a short distance from the aperture, large, nearly circular, provided with numerous, slender, convergent spinules, which nearly reach the center, giving the pore a stellate appearance. Avicularia near the lateral margin, about opposite the median pore, varying in size and form; in the same colony some are short triangular, others long triangular, while others with a long and acute erect tip show the transition toward vibra-

*This species has been recorded from the Gulf of St. Lawrence by Packard and others, but I have myself seen no American examples.

†This name has recently been given to a new genus, in a new sense, by Hincks, in accordance with a practice that is nearly always unsafe, as well as confusing.

eula. Length of zoœcia, 0.60^{mm} to 0.70^{mm} ; breadth, 0.50^{mm} to 0.60^{mm} ; breadth of apertures, 0.12^{mm} to 0.15^{mm} ; of median pore, 0.05^{mm} to 0.06^{mm} . The zoœcia are about twice as large as those of *P. ciliata*.

Casco Bay, Maine (U. S. Fish Commission, 1873).

In the nearly circular form of the median pore this species approaches the genus *Porina*, as restricted by Smitt (Florida Bryozoa); but in all other respects, except size, it agrees so closely with *P. ciliata*, made the type of *Porellina* by Smitt, as to forbid a generic separation, although the latter has a crescent-shaped pore.

The genus *Porellina* was, however, originally established by D'Orbigny for erect fossil species, having the surface foveolated. In his system, the present species would belong to *Reptoporina*, based on the encrusting forms with aperture and special pore as in *Porina*. Perhaps it may be desirable to separate generically the species having the hemispherical apertures, median ciliated pore, and sublateral avicularium, as in this species and *P. ciliata*, whatever be their mode of growth.

Mr. Hincks has recently proposed a genus, *Microporella*, with *P. ciliata* as type, which might also, if adopted, include the present species. *Diporula* Hincks* seems scarcely worthy of generic separation from the latter.

Smittia Hincks (= *Escharella* Smitt, non Gray).

The genus *Escharella*, as defined by Smitt, still included somewhat heterogeneous species. The form of the zoœcial aperture, chiefly relied upon by both Smitt and Hincks, proves to be a rather indefinite character, since it varies in the form and breadth of the sinus, in the several species now known, from an ill-defined, broad, shallow sinus, nearly as in *Lepralia*, to a deep and narrow one, like that of *Escharina* (*Hippothoa* Smitt). It would appear best, therefore, to combine, with the form of the aperture, the presence of a median avicularium in front of the sinus, or within its margin. The mere form of growth, presence or absence of pores in the zoœcia and oœcia, are of no importance generically, as Smitt has well shown. This restriction would exclude *E. sanguinea* Sm., *E. Jacotini* Sm., and some other species, most of which can be well referred to *Escharina* (*Schizoporella* Hincks), as here limited. The species first described in 1853, by Stimpson, as *Flustra solida* (= *Eschara palmata* Sars), and referred to *Escharella* by Smitt, seems, however, worthy of generic separation, on account of the chitinous fibres strengthening the zoarium. It appears to belong to the genus *Flustri-morpha* Gray, so far as can be determined by his description, in which the position of the avicularia is not mentioned, nor even the exact form of the zoœcial apertures.

As to the correct name for this natural and important genus, there is still room for diversity of opinion. *Escharella* Gray, 1848, (non D'Orbigny), certainly ought not to have been restricted to this division, for

*Annals and Magazine of Natural History, vol. iii, p. 156, Feb., 1879.

it included only three species, neither of which belongs to the present group. Moreover, his first species (*immersa*) and third species (*variolosa*, in part) belong to the older genus *Escharoides*, as restricted and adopted by him in the same work. The second is a *Porina* or *Porellina*. Therefore it would be better to regard *Escharella* as a synonym of *Escharoides* Edw. (1835), in Gray's restricted sense. *Escharella* D'Orbigny (1852) was established wholly independently of Gray's genus, and is a group entirely distinct from Gray's, and if the name is to be used at all, it should be used only in D'Orbigny's sense. *Smittia*, recently proposed by Hincks (Ann. and Mag., Feb., 1879), may well be adopted, therefore, for the present group. The following species, from our coast, belong to this genus:

Smittia porifera (Smitt) Hincks. Massachusetts Bay to Labrador, common.

Smittia candida (Stimp.) Verrill. Gulf of Maine, Bay of Fundy, etc.

Smittia globifera (Packard) Verrill. Casco Bay to Labrador, common.

Smittia auriculata (Hassall?) Verrill. Gulf of Maine.

Smittia Landsborovii (Johnst.) Hincks. Massachusetts Bay, northward, common.

Smittia bella (Busk) Hincks. Gulf of St. Lawrence (Whiteaves).

The last species I have not seen from our coast; but I have at least two additional, undetermined species.

***Smittia candida* V. (= *Lepralia candida* Stimpson).**

This species has been entirely misunderstood by Smitt and others, owing doubtless to the imperfection of the original description. Stimpson's figure, however, represents very well the form of the aperture and of the zoëcia in young colonies, without oëcia and avicularia. The zoëcia are rather large, and conspicuously perforated over the front; the aperture has a distinct rounded sinus. The avicularia, which are usually absent on many or most of the zoëcia of a colony, are large, obtusely rounded at the end, commonly placed transversely just in front of the sinus, or sometimes partially within it, but on some crowded colonies varying much in direction, some being direct, others oblique, others transverse. Oëcia large, globose, usually perforate, but sometimes, when highly calcified, the pores mostly disappear, or become small, and the surface becomes rough and granulous. It is very closely related to *S. porifera*, but has larger zoëcia and avicularia, while the usual obliquity of the latter is generally distinctive.

***Smittia globifera* V. (= *Lepralia globifera* Packard, Canadian Naturalist, vol. viii, p. 405).**

This species is very closely related to *S. auriculata*, with which I have, in former papers, united it. As compared with an authentic English specimen of *S. auriculata*, received from the Rev. A. M. Norman, the zoëcia and avicularia are about one-half larger, but of nearly the same form. The zoëcia are less regularly perforated. In our species, the

oœcia are prominent, but scarcely globose, the front surface being more or less flattened, and perforated with rather large pores, which are mostly confined to the flattened front surface. The median avicularium is well-rounded, direct, and just in front of the well-defined sinus. This species occurs in the encrusting (Lepralian) form, and also in the various foliaceous (Hemescharine) states, sometimes cup-shaped, saucer-shaped, and hat-shaped, according to place of growth. It is very common in the Bay of Fundy and on the Grand Banks.

Escharina Edw., 1835, = *Hippothoa* (pars) Smitt, = *Schizoporella* Hincks, 1879.

Edwards, in establishing this generic group, assigned a definite species as its type (*E. vulgaris* Moll); and although he afterwards united with it several incongruous species, the name ought to be retained for the group including his specified type. The earlier name, *Hippothoa* Lamouroux, adopted by Smitt for this group and the true *Hippothoa*, combined with it by him, should, of course, be retained for the group typified by *H. divaricata*, from which *H. hyalina* (type of *Celleporella* Gray) does not appear to me to be generically distinct. The name given by Edwards, being next in order,* and definitely applied, should, therefore, be retained for the present group. Moreover, Gray, in 1848, when restricting the genus, retained the name for the typical group. The name *Herentia* Gray, as restricted by Smitt, would also be available for this group, if *Escharina* could properly be rejected. In any case, the new name proposed by Hincks seems wholly unnecessary.

Escharina, as understood by me, includes those species which have the primary zoœcial aperture more or less subcircular, with a distinct, often narrow, median sinus, and with the avicularia lateral, when developed. Mode of growth various, but more generally encrusting in a single layer; sometimes, as in *E. Isabelliana*, forming thick masses, consisting of numerous layers of cells. Our species, so far as determined, are as follows:

Escharina Isabelliana D'Orb. = *E. variabilis* Leidy.

Escharina reversa Verrill. Perhaps a variety of the preceding.

Escharina linearis (Hassal).

Escharina biaperta (Mich.).

Escharina secundaria (Smitt).

Escharina ansata (Johnst.) Gray.

Escharina porosa Verrill, sp. nov.

One or two undetermined species are also in our collection.

Escharina porosa Verrill, sp. nov.

Escharella pertusa Verrill, Amer. Journ. Sci., vol. x, p. 41, 1875, (*non* Smitt).

Zoarium encrusting shells and stones. Zoœcia large, oblong, perforated by numerous, rather large, round pores; apertures large, roundish,

*The name *Escharina* was used by Ehrenberg in 1834 as the name of the family, but in that sense it was a synonym of *Escharidae* Fleming, 1828, and consequently might be used as a generic name in another sense.

with a broad, shallow, median sinus, and small, lateral, opercular denticles. Oœcia large, prominent, globose, the surface rough with sharp granules, and perforated by small, inconspicuous pores. Avicularia scarce, often absent, when present lateral, opposite the side of the aperture, broad, obtusely rounded, the point directed toward the zoœcial aperture. Color, when dry, reddish brown.

Vineyard Sound and Long Island Sound, 8 to 12 fathoms, common.

The species here described has a close resemblance to both *S. porifera* and *S. candida*, and when the avicularia and oœcia are wanting it will not be easy to distinguish them. The resemblance to *S. candida* is particularly close, and extends even to the oœcia, but these are rougher and less porous in *E. porosa*. The situation and form of the avicularium are, however, the best diagnostic characters.

This species is closely related to *E. sanguinea* (Norman) of Europe. It also has a general resemblance to *E. pertusa* (Esper), as described by Smitt; but there appears to be great confusion in regard to the identification of the latter, and doubtless several species have been confounded under that name. Hincks refers *pertusa* to *Lepralia*. American writers have referred several distinct species to *pertusa*, and I am not sure that the genuine *pertusa* inhabits our coast. The species thus named by Dawson, on examination of specimens kindly furnished by him, proves to be *Smittia porifera*. Probably *S. candida* has also been identified as *pertusa* by some writers.

The generic relations of the species, well described and figured by Smitt as *Escharella Jacotini* (Aud.), has been variously determined. In Gray's system, it appears to have been united with one of the forms of *Escharoides coccinea*, under the name of *variolosa*, and referred to *Escharella*. Smitt placed it under *Escharella* in a special subdivision. It seems to me, however, to have more definite relations to the genus *Discopora*, as defined by Smitt, and more particularly to that subdivision of *Discopora* which includes *D. pavonella*, *D. appensa*, etc., characterized by having lateral avicularia, and with a median denticle at the proximal edge of the primary zoœcial aperture, and to which the name *Mucronella*, given by Hincks to the group called *Discopora* by Smitt, may be properly restricted.

We may subdivide *Discopora* into three natural groups, easily defined, as follows:

Discopora Lamarek (*pars*), restricted by Edw. (*non* Fleming; *non* Gray).

Discopora (*pars*) Smitt, Skandinaviens Hafs-Bryozoer, p. 25, 1868. *Palmicellaria* (*pars*) Hincks.

The type of this genus, as restricted by Edwards, was *D. verrucosa* Lam. (*non* Esper). As shown by Edwards, this species is very distinct from Esper's species, and is closely allied to the well-known *D. Skenei* of the North Atlantic. Gray was, however, misled by the quotation of Esper's name in the synonymy, and erroneously took Esper's species as

the type of *Discopora*. Hincks attributed the name to Fleming, who used it in a different sense, and, apparently overlooking the fact that the name originated with Lamarck, rejected it for the original group.

Discopora, as I propose to restrict it, is characterized by having both median and lateral avicularia, with the former (or both) often raised on a prominence in front of the zoöcial aperture. *D. Skenei*, with its Lepralian form described as *L. crassispina* by Stimpson, is the only known New England species.

Escharoides Edw., in Lam., 1835; Gray (restr.), 1848, (*non* Smitt).

Mucronella (pars) Hincks, 1879.

Type *E. coccinea* (Abildg.), as defined by Smitt, = *E. Peachii* (Johnston).

This group includes those species of *Discoporidæ* having a prominent median denticle, but without avicularia. The zoöcial aperture is usually somewhat raised, and is often armed with marginal spines. As *E. coccinea* was one of the species originally included by Milne Edwards, Gray's restriction was correctly made, and should be adopted.

The typical species, with several varieties, abounds on our coast.

Mucronella Hincks (restricted), Ann. & Mag., iii, p. 162, 1879.

Discopora (pars) Smitt, Skandinaviens Hafs-Bryozöer, p. 25, 1868.

Characterized by having lateral avicularia on one or both sides of the zoöcial aperture, but without the median avicularium. Median denticle of various forms, often small. Apertures armed or unarmed with spines. Growth various, most often encrusting, foliaceous, or lichen-like, sometimes forming thick crusts composed of many layers. Our species are as follows:

Mucronella appensa (Hassall) Verrill.

Mucronella pavonella (Alder) Hincks.

Mucronella nitida Verrill = *Discopora nitida* V., 1875.

Mucronella Jacotini (Aud.) V. = *Escharella Jacotini* Smitt.

Mucronella scabra (Fabr.) V. = *Discopora scabra* Smitt.

M. scabra, var. *labiata* (Stimp.) = *Lepralia labiata* Stimp.

Mucronella ovata (Smitt) V. = *D. scabra*, var. *ovata* Smitt.

Mucronella nitida Verrill.

Discopora nitida Verrill, Amer. Journ. Sci., ix, p. 415, pl. vii, fig. 3, 1875.

This species is very abundant in Vineyard Sound and Long Island Sound. Although it is an encrusting species, when young often forming small, thin, radiating patches, when old it forms thick, irregular, cellular crusts, composed of numerous layers of cells. Some of these finally become large, subglobular masses, with an uneven surface, sometimes two inches or more in diameter. The color, when recently dried, is usually bright greenish yellow, sometimes brownish. The younger cells have the walls of both oöcia and zoöcia uniformly perforated; when older, the bounding walls become raised; a marginal row of conspicuous pores remains, while those over the front mostly disappear, or are obscured by granules; the pores of the globose oöcia also mostly dis-

appear and their surface becomes roughly granulous. The lateral avicularia are generally abundant, very few cells being without one or both; they vary somewhat in size, form, and position, but are usually small and near the aperture. The zoöcial aperture is small, always with a small, squarish mucro in front, and with a slender lateral process on each side for the articulation of the operculum. In the secondary stages of calcification, a strong, prominent, flat process often rises up on each side of the aperture.

Mucronella scabra Verrill.

The relationship of *M. scabra* is not always obvious, owing to the fact that usually only one large lateral avicularium is developed, and this is crowded so far in front of the zoöcial aperture as to appear like a large, rostriform, median avicularium, facing sidewise. A careful examination of the young cells will, however, usually show some cells with two lateral avicularia, with the small median denticle of the aperture between them.

Escharopsis Verrill = *Escharoides* Smitt (*non* Edw.).

Bulletin National Museum, No. 15, p. 149, 1879.

I proposed this name for a group, including two of our larger, northern, Eschara-like species. The zoöcial aperture has a narrow median sinus, which in the later stages of growth includes within it a small laterally placed avicularium, facing sidewise. The genus is otherwise apparently closely related to *Escharina*, *Celleporaria*, and *Retepora*.* Smitt, in his Florida Bryozoa, even referred one of the species to *Retepora* (*R. rosacea*). The growth of both our species is often Lepralian and foliaceous as well as Escharine.

Escharopsis lobata (Lamx.) Verrill = *Escharoides Sarsii* Smitt = *Lepralia producta* Packard.

Escharopsis rosacea (Sars) Verrill = *Escharoides rosacea* Smitt.

TUNICATA.

Ascidia inornata, sp. nov.

In expansion the body is upright cylindro-conical, about twice as high as broad; the base is about the same in diameter as the middle portion, and but very little expanded. The oral tube is much longer than the other, subterminal, swollen at base, tapering, the upper part cylindrical, the opening surrounded by seven low, rounded, thin lobes or crenulations, between which are seven orange-colored ocelli; corresponding with the ocelli there are seven thickened, pointed lobes or folds of the test, which run down from them along the tube as slightly prominent costæ, with transverse wrinkles between them. The anal tube is subterminal, shorter and smaller, situated to one side, and only about half

* In a paper received from Dr. Smitt, since the above was written, he has enlarged his genus *Discopora*, so as to include the northern species of *Retepora* (*R. cellulosa* and *R. elongata*), and also the species here called *Escharopsis rosacea*. (Öfversigt af Kongl. Vet.-Akad. Förh., 1878, p. 30.)

as long as the oral. Its orifice is surrounded by six lobes and ocelli, like those of the other. Test moderately thick and firm, somewhat wrinkled, nearly glabrous, translucent, dull yellowish, blotched more or less with russet-brown. The internal organs show through faintly as yellow and dark markings. Height, in expansion, 32^{mm} ; greatest diameter, 17^{mm} ; length of oral tube, 12^{mm} ; of anal, 4^{mm} to 5^{mm} .

Johnson's Bay, near Eastport, Me., 12 fathoms, stony, August 8, 1872.

Halocynthia Verrill = *Cynthia* Savigny (*non* Fabr., 1808).

Bulletin National Museum, No. 15, p. 147, 1879.

This name was proposed for the restricted genus *Cynthia* of Savigny, characterized by having both apertures quadrangular, and ovaries developed on both sides. The species now known from our northeast coast are as follows:

Halocynthia pyriformis (Rathke) = *Cynthia pyriformis* authors.

Halocynthia rustica (Linné) = *Ascidia monoceros* Möller.

Halocynthia tuberculum (Fabr.) = *Cynthia carnea* (Ag.) Verrill.

Halocynthia pulchella Verrill = *Cynthia pulchella* Verrill.

Halocynthia echinata (Linné) = *Cynthia echinata* authors.

Halocynthia partita (Stimp.) = *Cynthia partita* Stimpson.

MOLLUSCA.

Xylophaga dorsalis (Turton).

Many living specimens of this species have been found in bits of old wood, dredged in Casco Bay; in 100 to 110 fathoms, about thirty miles off Cape Ann; and in various parts of Massachusetts Bay and Cape Cod Bay. It has previously been recorded by Mr. J. F. Whiteaves from Gaspé Bay. Found on the European coast south to the Adriatic.

Lunatia nana (Möller) G. O. Sars, Moll. Reg. Arct. Norveg., p. 159, pl. 21, fig. 16.

Natica nana Möller, Kroyer's Tidss., vol. iv, p. 80, 1843.

Three living specimens of this species were dredged on Stellwagen's Bank, north of Cape Cod, in 26 to 32 fathoms, sand, by the U. S. Fish Commission, 1879. It has not previously been recorded from the American coast; but it was dredged in 1872 by Messrs. Smith and Harger, in 45 fathoms, on Le Have Bank. It is easily distinguished from all our other species of the group by its horny operculum and closed umbilicus. Except in the last character, it resembles *L. immaculata*. Its color is ivory-white, shining.

Dendronotus robustus Verrill, Amer. Journ. Science, vol. 1, p. 405, fig. 1, 1870.

Dendronotus velifer G. O. Sars, Mollusca Reg. Arctice Norvegie, p. 315, tab. 28, fig. 2, tab. xv, fig. 4 (dentition), 1878.

The species well-described and figured in the excellent work of Sars is identical with the American form. Our *D. robustus* was described from a specimen not fully grown; but we have since dredged it of larger size, agreeing with *D. velifer*, in numerous localities, from off Cape Cod

to Nova Scotia, in 20 to 100 fathoms. The dentition of our original specimen is like that figured by Sars for *D. velifer*.

Idalia pulchella Alder and Hancock.

Idalia pulchella G. O. Sars, op. cit., p. 313, tab. 28, fig. 1, *a-c*, tab. xiv, fig. 8 (dentition), 1878.

This species has been found, for the first time, upon the American coast, by Mr. J. H. Emerton, who discovered it at Salem, Mass., this season. He has kindly sent me a specimen and a colored drawing of the species, which he had already determined. The specimen agrees very closely with Sars's description and figures, both in external characters and in dentition, but not so well with those of Alder and Hancock.

ANTHOZOA.

Bolocera multicornis, sp. nov.

A large, handsome species, broad and low, with a multitude of moderate-sized tentacles, crowded in many rows, and covering the greater part of the disk. Column smooth, very short; in our specimen the disk was so expanded that the margin was on a level with the base; a smooth rim below the bases of the tentacles. Tentacles very numerous (several hundred), crowded in twenty or more indistinct, close, concentric rows, which entirely cover and conceal the disk, except a narrow, naked zone around the mouth; they are changeable in form, often cylindrical and blunt at tip, at other times fusiform, clavate, or swollen in any part, their length nearly equal in extension, and mostly less than a fifth of the diameter of the disk, or 14^{mm} to 18^{mm}. The disk, as expanded, is regularly convex, and the specimen showed no inclination to contract or withdraw its tentacles. Mouth with a distinct, gonidial groove at each end, bordered by a large fold or lobe on each side; sides of mouth with numerous irregular lobes or folds and wrinkles. Color of body and tentacles nearly uniform bright red-lead color or orange-scarlet; mouth-folds a deeper tint of the same color.

Diameter of expanded disk, about 3.75 inches, or 194^{mm}; height at center, 30^{mm} to 33^{mm}.

One specimen only, dredged off Cape Cod, in 45 fathoms, shelly bottom, 1879 (U. S. Fish Commission).

Edwardsia pallida, sp. nov.

A long, slender, soft, flaccid, whitish species. Column smooth, destitute of any investment, but sometimes with grains of sand, slightly adherent; surface faintly longitudinally sulcated, and sometimes finely wrinkled transversely. The form is somewhat changeable, usually much elongated, nearly cylindrical, but often tapered at the posterior end. Tentacles about twenty-four, slender, the length about twice the diameter of the body, of nearly uniform diameter to near the tip, translucent whitish, often with a pale olive-green central line, interrupted by a line of opaque white spots, often ten to twelve on a tentacle, or sometimes

by transverse lines of white; the central dark line is sometimes absent; column translucent, dull gray or grayish white, striped with narrow flake-white lines, between which the dark internal organs show through; a circle of lunate spots of opaque yellowish white is situated just below the tentacles, corresponding with the broad longitudinal stripes. Disk often much protruded, yellowish white, radiated with opaque white.

Provincetown, Mass., in sand, at low-water (U. S. Fish Commission, 1879).

Anthothela, gen. nov.

This generic division is proposed for the *Briareum grandiflorum* (Sars) and allied species. It is related to *Briareum* and *Paragorgia* in having a soft spiculose axis, but its polyp-cells are prominent and permanently exsert, and the polyps themselves are not entirely retractile. The cœnenchyma is thin, and often spreads out irregularly over foreign bodies or around the base, as an encrustation.

Anthothela grandiflora (Sars) Verrill.

Briareum grandiflorum Sars, Fauna Litt. Norvegiæ, p. 63, pl. 10, fig. 10-12.

This species has been obtained in several instances by the Gloucester halibut fishermen in deep water, off Nova Scotia, and presented to the U. S. Fish Commission. It was first obtained by Capt. N. McPhee and crew, of the schooner "Carl Schurz," off Sable Island.

Halipterus Christii (Koren and Dan.) Kõlliker.

A single specimen of a species of *Halipterus*, which is, perhaps, identical with the above species, although differing somewhat from the descriptions and figures of the Norwegian form, has been presented to the U. S. Fish Commission by Capt. Thos. F. Hodgdon and crew, of the schooner "Bessie W. Somes," from the Grand Bank.

Alcyonium digitatum Linné (?).

Two specimens, which I refer very doubtfully to this species, were taken by Captain Greenwood and crew, of the schooner "Sultana," in 80 fathoms, on Clark's Bank, east of Cape Cod.

They form low, thick, lobular masses, with the polyps scattered over the entire surface, except at the very base, and everywhere showing the cœnenchyma between them. The base is somewhat spreading, and there is no main trunk, for the division into rounded or flattened lobes takes place close to the base, and they again subdivide, so that a group of short, thick, obtuse lobes, partly rounded and partly flat, results. The polyps are rather larger than in *A. carneum*, and some are retracted into the cells that are scattered over the cœnenchyma, and others more or less expanded; toward the summits of the lobes they are more numerous, but not crowded. The surface of the cœnenchyma, under a lens, shows a granular appearance, due to the small white spicula.

If not identical with *A. digitatum* of Europe, it is at least very closely

related, and belongs to the same section of the genus. A comparative study of the spicula has not yet been made.

Alcyonium multiflorum, sp. nov.

A large, upright species, with a tall bare trunk, which divides near the top into numerous divergent cylindrical branches, which are naked, except near the ends, where they again subdivide in the same way into secondary branches, which in turn divide again into a cluster of short, terminal branchlets. The ultimate branchlets bear at their ends an umbel-like cluster of crowded polyps, which in contraction form rounded groups. The whole forms a panicle-like structure, not unlike a cauliflower—a resemblance noticed by the fishermen. The minute polyp-cells are closely crowded at the ends of the branchlets, so as to leave no naked cœnenchyma visible between them. They are apparently not retractile, but the tentacles are often contracted into eight rounded, minute, rather rigid lobes at the summit of the polyps, which, in contraction, have small, short bodies. The branches, branchlets, and trunk are usually sulcated in alcoholic specimens, and have a smooth, scarcely granular surface. The surface is smoother than in *A. carneum*, though the structure of the cœnenchyma and interior is firmer and less flexible. Height, about 4 to 5 inches; breadth, about 3 inches, in contraction. Some specimens are considerably larger. Color, in alcohol, yellowish white; in recently preserved specimens, bright red, stained with purple.

Received from Daniel McKinnon and crew, of the schooner "Mary F. Chisholm," N. lat. $44^{\circ} 06'$, W. long. $52^{\circ} 54'$, 220 fathoms. Taken also by Captain John E. Wilson and crew, of the schooner "Polar Wave," in 200 fathoms, N. lat. $44^{\circ} 30'$, W. long. $57^{\circ} 08'$, and in various other localities, in deep water, by the fishermen. Called sea-cauliflower by the fishermen. Closely related to *A. carneum*, but differs in having smaller polyps, which are so crowded as to show no bare cœnenchyma between their bases. The naked branches are longer and more panicle. It resembles in general appearance the *Gorgonia florida* Müller (Zool. Danica); but the latter appears not to be known to modern Scandinavian writers, and its affinities are doubtful.

Alcyonium Lütkeni, sp. nov.

Alcyonium glomeratum Lütken, MSS. (non Johnston).

Several specimens of a species agreeing perfectly with Greenland specimens sent to me several years ago, under the above MSS. name, by Dr. Chr. Lütken, were dredged in 52 fathoms, off Halifax, N. S., by the U. S. Fish Commission, in 1877.

It may be distinguished by having the integument, especially of the polyp-bodies and bases of the tentacles, filled and covered with spicula, so as to render them decidedly rigid and incapable of complete contraction. The main stem is upright, without polyps, giving off cylindrical branches along the sides; from these small lateral branchlets arise all along their sides as well as at their ends, each bearing a cluster of

three to five, or more, polyp-cells, which are larger than in *A. carneum*, and, when contracted, are obovate, incurved, and show the bases of the eight tentacles as small terminal lobes. The spicula are larger and rougher than in *A. carneum* and the two preceding species. Height, 3 inches, or more.

ECHINODERMATA.

Tremaster, gen. nov.

Body thin, pentagonal, the rays united by a thin interrarial web extending to their tips. Five interrarial openings, situated toward the center of the disk, pass directly through to the lower side, where they open at the aboral side of the jaw-plates. Ambulacral grooves wide toward the mouth. Suckers in four rows. Upper surface covered with imbricated flat plates, which may bear granules and marginal spinules. Lower surface with small imbedded plates, bearing spines.

Tremaster mirabilis, sp. nov.

Body thick in the central region, very thin at the margin, the ends of the rays extending but little beyond the interrarial margin, while the interrarial web extends in a rounded lobe a little beyond the proper end of the rays, so that there is at the tip a slight but evident emargination. In all the specimens, the body is bent upward in a very convex form, with the rays and margin bent abruptly downward, so that the edges are in contact with the ground, or nearly so, all around, leaving a large concavity underneath. The margin is thrown into a broad fold or undulation between the rays. On the dorsal surface, the imbricated plates of the radial regions are more prominent, thicker, and with a broader free portion than those of the interrarial regions, and they bear a row, sometimes of eight to ten small, acute, appressed spines (often but one or two in the young) along the free edge; these plates form, therefore, a regular rosette or star on the dorsal surface, its rays broad at the base and rapidly narrowed toward the margin, where the plates become very small and lack the spinules; all the dorsal plates are covered with small scattered granules, often with one or several larger central ones. In the interrarial areas, the plates are thin, flat, the inner or free ends are oval and destitute of spines, and each plate is usually overlapped by only two, laterally placed, and not by the one directly behind it, as in the radial areas; these plates are large and somewhat rhomboidal toward the central area of the disk, but become very small and rounded toward and at the margin; each minute lower marginal plate bears a small ovate spinule, which form a close row or fringe around the margin. The central area of the disk is covered by large granulated plates; four or five, somewhat irregular in form, surround the central opening, which is protected by a circle of about twelve to eighteen small, obtuse spines. Madreporic plate prominent, close to the central opening, surrounded by small spinules. The five disk-perforations are large and conspicuous, when distended elliptical in form, and bordered by a row of small spines, which often converge above it. The interrarial areas of the lower surface are formed

by small, more or less oblong plates, which become very small toward the margin; each bears a spine, which toward the mouth are rather long and acute, gradually becoming shorter, flatter, and blunter toward the margin, near which they are spatulate, but close to the margin they become very small and slender. The adambulacral plates are transversely elongated; each usually bears four spines, the two inner small, slender, acute, the innermost the smaller, and two outer much larger and stouter ones, the outermost usually the largest, flattened and often slit or channeled at the end. The disk-perforations are large, rounded, with a smooth rim, and not surrounded by special spines. Jaw-plates prominent, each bearing at the oral end two or three long, acute spines, and others on the upper surface, while on the lateral margin a row of six or eight smaller, slender spinules, usually with a second row behind them, of fewer spines. Ambulacral suckers and pores large, arranged in two alternating rows on each side of the median line; the grooves are broad and deep.

Color of specimens recently preserved in alcohol, deep orange-red above, yellowish-white beneath. The surface is covered with a soft, thin, mucous layer. Greatest diameter of the largest specimen, 112^{mm}; lesser or interradi al diameter, 100^{mm}; breadth of larger dorsal plates, 9^{mm} to 11^{mm}; length of longest adambulacral spines, 8^{mm} to 9^{mm}. A smaller one has the greater radius 63^{mm}; lesser, 55^{mm}; breadth of larger dorsal plates, 6^{mm}; length of largest adambulacral spines, 4^{mm} to 5^{mm}; of inner ones, 1^{mm}.

This remarkable new starfish has hitherto been obtained only by the Gloucester halibut fishermen, who have presented three specimens to the U. S. Fish Commission. The first specimen was taken by Capt. Charles Anderson and crew, of the schooner "Alice G. Wunson," in 250 fathoms, off George's Bank, N. lat. 42° 08', W. long. 65° 31', April 28, 1879. The largest specimen was taken by Capt. Thomas Olson and crew, of the schooner "Epes Tarr," in 150 fathoms, N. lat. 47° 06', W. long. 58° 15'. Another specimen was taken in 220 fathoms, by Captain Kilpatrick and crew, of the schooner "Polar Wave," in N. lat. 44° 32', W. long. 57° 09'.

***Porania spinulosa*, sp. nov.**

Greater radius, 40^{mm}; lesser radius, 23^{mm}. Whole upper surface covered with fine, sharp spinules. Pores on the dorsal surface very numerous, arranged in irregular groups of 6 to 15 or more, over the whole upper surface of the disk and rays, and in a marginal series between the upper and lower marginal plates. Lower marginal plates with a group of ten to twelve sharp spinules, in two or more rows on each plate. Lower surface with large, oblong, flat plates, separated by radial grooves, and bearing at their outer ends a row of two or three small, appressed spines; their surface bearing scattered, small, sharp granules. Adambulacral spines sharp, in several rows; two inner ones

side by side on each plate; one, somewhat stouter, farther out, alternating with them; outside of these are usually two, obliquely placed, divergent and usually pointing toward the end of the rays; jaw-plates bearing somewhat larger acute spines.

Color, in life, orange-red, mottled with brighter red on the dorsal side; beneath, light yellow.

Two characteristic specimens of this species have been dredged by the U. S. Fish Commission, off Cape Cod, in 80 fathoms, mud, 15 miles N. 65° E. from Race Point; the other in 130 fathoms, mud, 26 miles E. by N. from Race Point Light. Another specimen was taken by Capt. Thomas Goodwin and crew, of the schooner "Howard," in 170 fathoms, N. lat. $45^{\circ} 25'$, W. long. $57^{\circ} 10'$.

This species differs so much from typical *Porania* that it might well form a new generic type. It has not the smooth, naked skin of typical *Porania*.

Archaster tenuispinus Duben and Koren.

Several specimens of this species have been recently presented to the U. S. Fish Commission by the Gloucester halibut fishermen, from deep water, off the Nova Scotia coast. It is a new addition to the American fauna. They vary in size from about 35^{mm} in diameter up to 250^{mm}.

The largest specimen was presented by Capt. Daniel McKinnon and crew, of the schooner "Mary F. Chisholm." It was from 130 to 160 fathoms, N. lat. $45^{\circ} 02'$, W. long. $56^{\circ} 11\frac{3}{4}'$. Two smaller ones, one from 128 fathoms, N. lat. $40^{\circ} 28'$, W. long. $55^{\circ} 25'$, February, 1879, the other from 250 fathoms, N. lat. $42^{\circ} 40'$, W. long. $63^{\circ} 06'$, were presented by Capt. Daniel McEachern and crew, of the schooner "Gny Cunningham." With the latter were fine specimens of the rare simple-armed Ophiuran, *Astrochele Lymani* V., much larger than the original type.

Astrophyton Lamarckii Müller and Troschel.

Numerous specimens of this species have been obtained in deep water off George's Bank and off the Nova Scotia coast by the Gloucester fishermen, and presented to the U. S. Fish Commission. They are found clinging to *Paragorgia arborea*, *Primnoa reseda*, *Aleyonium carneum*, and other Aleyonaria.

Easily distinguished from *A. Agassizii* and *A. euenemis*, both of which also occur in the same region, by the granulation of the disk, which is entirely covered, both over the ribs and interrational spaces, by coarse granules.

Ophiacantha millespina, sp. nov.

A five-rayed species, allied to *O. bidentata* Ljung. (= *O. spinulosa* M. & Tr.), but distinguished readily by the very numerous and minute three-pronged and four-pronged, slender spines which thickly cover the disk. The mouth-plates are four-lobed or somewhat cross-shaped, the outer lobe narrow and long, extending into the interbranchial spaces; the inner lobe is nearly triangular; the side-lobes are nearly as long as the outer

lobe, but narrower. Mouth-papillæ large, stout, subacute, usually three on each side of the jaw, the outermost thicker than the others, which are compressed. Arm-spines numerous, long, slender, tapered, subacute, translucent, rough with small acute spinules; the upper spines on the two or three joints just beyond the margin of the disk are longer than the rest, being considerably longer than the diameter of the arm; on the second joint beyond the disk the two rows nearly meet on the dorsal side, there being ten in each row; farther out the number is soon reduced to seven or eight, the upper ones longest, the lower ones short. Under arm-plates, near the base of the arms, short and broad, with a small central angle on the proximal edge; the distal edge curved. Farther out they rapidly become narrower and longer, the proximal angle becoming more prominent and the lateral edges being incurved, while the distal edge is convex. The ventral plates are separated by the side arm-plates. Diameter of disk, 11^{mm}; length of arms, 45^{mm} to 50^{mm}; of longest arm-spines, 4^{mm}. Color, in alcohol, yellowish white.

Taken on the eastern slope of George's Bank, in 220 fathoms, and presented by Captain Anderson and crew, of the schooner "Alice G. Wunson."

PORIFERA.

Cladorhiza grandis, sp. nov.

A large and remarkable species, with a strong, branched root, a long, stout, round, unbranched stem, and a very thick, elongated, club-shaped, compact body, from which a large number of lateral processes diverge, on all sides, nearly at right angles, so as to resemble somewhat an Indian war-club. The lateral processes are long, round, enlarged at base, and swollen or clavate toward the end, which terminates in a fascicle of slender setæ; other clusters of setæ project from and roughen the surface of the swollen end. These lateral processes are arranged irregularly, but rather uniformly, and often appear to form eight to ten or more irregular rows, but are more commonly without order, and about half an inch apart at base, diverging on all sides, more or less curved to one side or downward, the lowest and the uppermost somewhat shorter; their number, on the largest specimens, amounts to a hundred or more, while in the smallest observed there are about twenty; they are tubular, the small central tube connecting with larger cavities in the body of the sponge, at their bases; the internal cavity is lined with long, slender, longitudinal spicula, and their external surface is roughened with small projecting spicula, while the surface of the sponge-body is comparatively smooth. A large central bundle of long spicula runs through the whole length of the stem and body, and subdivides so as to go into all the branches of the root, which subdivides irregularly into numerous branches, differing in the different specimens. Color, in alcohol, yellowish white or clear white.

Height of largest examples, about 18 inches; diameter of the stem, 0.5 inch; of body, 1.5 inches; length of lateral processes, 1.5 to 2 inches; their diameter in middle, about 0.15 to 0.20 inch.

A moderate-sized specimen is 220^{mm} high; the root (imperfect) is about

40^{mm}; the stem, 70^{mm}; the body, 110^{mm}; diameter of the stem, 10^{mm}; of the body, 20^{mm}; length of lateral processes, 25^{mm}; their diameter in middle, 3^{mm} to 4^{mm}. The smallest specimen seen has the stem 40^{mm} long; the body, 30^{mm} long; diameter of the stem, 5^{mm}; of the body, 15^{mm}; length of lateral processes, up to 20^{mm}.

Numerous specimens of this very remarkable sponge have been brought in by the halibut fishermen from the deep-water fishing grounds off Nova Scotia, during the past year, and presented to the U. S. Fish Commission. Two of the best were taken by Captain McCormick and crew, of the schooner "Wachusett," in 180 fathoms, N. lat. 43° 17', W. long. 60° 58'. Several specimens have been presented by Capt. J. W. Collins and crew, of the schooner "Marion," from Banquereau.

NEW HAVEN, CONN., October, 1879.

DESCRIPTION OF A NEW GENUS AND SPECIES OF FISH, *LOPHOLATILUS CHAMÆLEONTICEPS*, FROM THE SOUTH COAST OF NEW ENGLAND.

By G. BROWN GOODE and TARLETON H. BEAN.

A few days ago Captain William H. Kirby, of Gloucester, Massachusetts, took 500 pounds of a remarkable new fish on a cod-fish trawl in lat. 40° N., lon. 70° W., at a depth of 84 fathoms, 80 miles south by east of Noman's Land. One of these was forwarded by him to the United States National Museum, and forms the type of a new genus and species. The single individual secured (No. 22899, Earl 342) is 33 inches long. The largest one taken, according to Captain Kirby, weighed 50 pounds.

The species appears to be generically distinct from the already described species of the family *Latilidae* Gill. It is related by its few-rayed vertical fins and other characters to the genus *Latilus* as restricted by Gill, but is distinguished by the presence of a large adipose appendage upon the nape, resembling the adipose fin of the *Salmonidae*, and by a fleshy prolongation upon each side of the labial fold extending backward beyond the angle of the mouth. For this genus we propose the name *Lopholatilus*.

Lopholatilus chamæleonticeps sp. nov.

DESCRIPTION.—The greatest height of the body (.306), which is at the ventrals, is contained about $3\frac{1}{3}$ times in the length to the origin of the middle caudal rays, and 4 times in the extreme length. Its greatest width (.144) equals the length of the caudal peduncle (.144); this latter being measured from the end of the soft dorsal to the origin of the middle caudal rays. The least height of the tail (.0867) is contained 4 times in the distance of the spinous dorsal from the snout.

The greatest length of the head (.33) is contained 3 times in the length to the origin of the middle caudal rays. Its greatest width (.165) is slightly more than twice the width of the interorbital area (.08). The length of the snout (.122) is contained twice in the length of the pectoral of the right side (.244). The length of the operculum to end of flap

(.11) is $\frac{1}{6}$ of total length. The length of the upper jaw (.15) equals $\frac{1}{2}$ the height of the body at the ventrals, and is contained $2\frac{1}{5}$ times in the length of the head. The maxilla extends to the perpendicular through the anterior margin of the orbit; the mandible does not quite reach the perpendicular through the middle of the orbit; the length of the labial appendage is slightly more than half the long diameter of the orbit and $\frac{1}{3}$ the length of the 1st pectoral ray. The length of the mandible (.156) slightly exceeds the distance from the snout to the orbit (.15), and equals 3 times the long diameter of the eye (.052), which is contained $6\frac{1}{2}$ times in the length of the head. The operculum and preoperculum are scaly; the latter is finely denticulated on its posterior margin. The distance of the posterior nostril from the eye equals the length of the first anal spine; the distance between the anterior nostril and the end of the snout is twice as great. The intermaxillaries are supplied with an outer series of about 19 canine teeth, and behind these a band of villiform teeth widest at the symphysis. The mandible has a few large canines and an inner series of small conical teeth continued from a patch of similar teeth at the symphysis; vomer and palatines toothless.

The distance of the adipose dorsal from the snout (.206) equals nearly 3 times its height (.07); its length of base (.123) equals the length of the snout. The height of the adipose dorsal equals the distance from the tip of the ventral to the vent.

The distance of the spinous dorsal from the snout (.347) equals the distance of the ventral from the snout (.347); its length of base (.144) equals the length of the caudal peduncle. The 1st spine is imperfect—what remains of it is $\frac{1}{3}$ as long as the 3d spine (.09). The 2d spine (.082) is about equal to the width of the interorbital area. The 4th and the 6th spine are equal in length (.097) and equal the distance from the end of the snout to the posterior nostril. The 5th spine (.095) is a little shorter than the 6th. The last spine (7th) is contained 10 times in the total length. The length of the first ray of the soft dorsal (.094) equals the distance between the anterior nostril and the end of the snout. The 13th, and longest ray (.147), about equals the length of the base of the spinous dorsal. The last ray (.07) is half as long as the 13th. The 13th ray of the soft dorsal extends to the origin of the external caudal rays.

The distance of the anal from the snout (.60) is about equal to twice the height of the body at the ventrals. The length of the anal base (.318) is slightly more than twice the length of the mandible. The 1st anal spine (.04) is half as long as the second dorsal spine. The 2d anal spine (.075) is half as long as the upper jaw. The 1st ray of the anal (.102) is as long as the last spine of the dorsal. The 11th, and longest anal ray (.134), is contained $7\frac{1}{2}$ times in the total length, and nearly equals the length of the middle caudal rays. The last anal ray (.078) is half as long as the mandible. The 11th ray of the anal extends almost to the perpendicular through the origin of the middle caudal rays.

The caudal is emarginate, the external rays being only $1\frac{1}{2}$ times as long as the middle rays. The length of the superior external rays (.216), measured from the origin of the middle rays, equals $1\frac{1}{2}$ times the length of the spinous dorsal base.

The distance of the pectoral from the snout (.32) very slightly exceeds the length of the anal base. The length of the pectoral of the right side (.244) equals twice that of the snout. The pectoral of the left side is probably imperfect; its length (.216) being equal to that of the superior external caudal rays. The right pectoral can be made to reach the vent; in its natural position it extends to the perpendicular let fall from the 4th ray of the 2d dorsal.

The distance of the ventral from the snout (.347) equals 4 times the least height of the tail. The length of the ventral (.183) equals twice that of the 3d dorsal spine, and it extends to a point under the third dorsal ray. The distance from the tip of the ventral to the vent equals half the length of the middle caudal rays. The vent is under the interval between the fourth and fifth dorsal rays.

Radial formula.—B. VI; D. VII, 15; A. III, 13; C. 18; P. II, 15; V. I. 5; L. Lat. 93; L. Trans. 8+30.

Color.—The operculum, preoperculum, upper surface of head, and major portion of the body, have numerous greenish-yellow spots, the largest of which are about $\frac{1}{3}$ as long as the eye. Upon the caudal rays are about eight stripes of the same color, some of them connected by cross blotches. The upper part of the body has a violaceous tint, and the lower parts are whitish, with some areas of yellow. The anal and ventral fins are whitish. The pectorals have the tint of the upper surface of the body, with some yellow upon their posterior surfaces. The soft dorsal has an upper broad band of violaceous, and a narrow basal portion of whitish. Many of the rays have upon them a yellow stripe; there are some spots of the same color, especially upon the anterior portion of the fin.

NOTE.—In the table of measurements, the unit of comparison is the length to the origin of the middle caudal rays.

Table of Measurements.

Current number of specimen	22,889.	
Locality	{ 80 miles S. by E. of Noman's Land.	
	Millime- tres.	100ths of length.
Length to origin of middle caudal rays.....	692	
Length to end of middle caudal rays.....	788	
Body:		
Greatest height (at ventrals)	212	30.6
Greatest width	100	14.4
Least height of tail	60	8.67
Length of caudal peduncle.....	100	14.4
Head:		
Greatest length	230	33
Greatest width	114	16.5
Width of interorbital area	56	8
Length of snout	85	12.28
Length of operculum	77	11
Length of upper jaw	105	15
Length of mandible	108	15.6
Distance from snout to orbit.....	103	15
Long diameter of eye	36	5.2

Table of Measurements—Continued.

Current number of specimen	22,899.	
Locality	{ 80 miles S. by E. of Noman's Land.	
	Millime- tres.	100ths of length.
Dorsal (adipose):		
Distance from snout	143	20.66
Length of base	85	12.28
Greatest height	48	7
Dorsal (spinous):		
Distance from snout	240	34.68
Length of base	100	14.4
Length of first spine (possibly broken)	20	3
Length of second spine	57	8.24
Length of third spine	63	9.1
Length of fourth spine	67	9.68
Length of fifth spine (possibly broken)	66	9.54
Length of sixth spine	67	9.68
Length of seventh spine	70	10
Dorsal (soft):		
Length of base	300	43.35
Length of first ray	65	9.4
Length of longest ray (thirteenth)	102	14.74
Length of last ray	48	7
Anal:		
Distance from snout	416	60
Length of base	220	31.79
Length of first spine	29	4.2
Length of second spine	52	7.5
Length of first ray	71	10.26
Length of longest ray (eleventh)	93	13.44
Length of last ray	54	7.8
Caudal:		
Length of middle rays	96	13.87
Length of external rays	{ superior .. 150	21.67
	{ inferior .. 145	21
Pectoral:		
Distance from snout	223	32.22
Length	{ right side. 169	24.42
	{ left side .. 150	21.67
Ventral:		
Distance from snout	240	34.68
Length	127	18.35
Branchiostegals	VI	
Dorsal	VII, 15	
Anal	II, 13	
Caudal	18	
Pectoral	II, 15	
Ventral	I, 5	
Number of scales in lateral line	93	
Number of transverse rows above lateral line	8	
Number of transverse rows below lateral line	30	

Capt. William Dempsey, of Gloucester, has since furnished nine fresh specimens of this *Lopholatilus* and the following information:

"The fish were caught with Menhaden bait in July, 1879, while 'trying' for cod 50 miles south by east of Noman's Land, in lat. $40^{\circ} 10' N.$, lon. $70^{\circ} 55' W.$, 75 fathoms, on very hard clay bottom. Two miles inside of this bottom there is nothing but a green ooze, on which no fish will live.

"Two of the 9 fish were spent females. The few remaining eggs of these 2 were not so large as those of the herring, and resemble the eggs of the Norway Haddock. The other 7 had nothing to determine whether they were male or female.

"The liver is small, somewhat like that of the mackerel, and contains no oil. The flesh is oily and will soon rust after splitting and drying.

"The stomach and intestines are small, the latter resembling those of an eel.

"The swim-bladder is similar to that of a cod.

"Some of the fish 'blister' like cusk when taken on deck."

"They were very abundant and bit freely."

The largest of the individuals brought in by Captain Dempsey has a bifid nuchal crest.

SMITHSONIAN INSTITUTION, July 30, 1879.

ON THE OCCURRENCE OF *LYCODES VAHLII*, REINHARDT, ON LA HAVE AND GRAND BANKS.

By G. BROWN GOODE and TARLETON H. BEAN.

The United States Fish Commission has received from Captain Z. Hawkins and the crew of the schooner "Gwendolen," of Gloucester, Mass., a fine specimen of a species of *Lycodes*, obtained on La Have Bank in latitude 42° 43' north and between the meridians of 62° 20' and 63° 30' west, at the depth of 300 to 400 fathoms, the schooner having changed position while fishing. A second specimen, 632 millimetres in length, was presented by Captain Wm. H. Greenleaf and the crew of the schooner "Chester R. Lawrence," who secured it on the Grand Banks. After a careful comparison of this species with that described by Reinhardt under the name *Lycodes VahlII*,* and previously recorded only from Greenland, we are inclined to believe the two identical.

Reinhardt's description of *Lycodes VahlII* is very full, and is supplemented by a long table of measurements, which has been very serviceable in the study of the specimens before us.

The dentition of the La Have specimen agrees exactly with that of *L. Verrillii*. The lower jaw has the teeth in two series, with an imperfect series of smaller ones between. The upper jaw has a single series of teeth, with a few smaller ones behind the symphysis. There are about seven teeth on the vomer and a single row of about seven on each palatine. The teeth are obtuse-conic, not curved as in *L. Verrillii*. In the specimen of *L. VahlII* from La Have, the colors are somewhat less regular in distribution than those described and figured by Reinhardt; instead of showing six light bands, the arrangement of light color upon the dark ground of the body is as follows: one white spot on each side, above the posterior end of the opercular flap, the spots not meeting on the dorsal line. The first saddle-shaped marking begins on the back, under the 8th ray of the dorsal fin, and extends on either side nearly to the middle of the body. The second saddle-shaped marking begins under the 27th dorsal ray and extends nearly to the margin of the fin, involving the width of about two rays and the connecting membrane, and extends also downward nearly to the middle line of the body, increasing in width as it descends. The next begins under the 54th ray, and resembles the last in form and extent. The next begins under the 79th, and, though smaller, resembles the others. The individ-

* Ichthyologiske Bidrag til den Groenlandske Fauna af Johannes Reinhardt, Professor. Vid. Selsk. Naturvidensk. og Mathem. Afl. vii, pp. 86-228. Eight plates (p. 153, pl. v).

ual from the Grand Banks is the largest yet recorded. The measurements are as follows:

Table of Measurements.

Current number of specimen.....	22,491.		21,991.		Measurements of type given by Reinhardt.*		Collett's measurements of a type-specimen.†	
Locality	Grand Banks.		La Have Bank.					
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.	Danish inches.	100ths of length.	Milli- metres.	100ths of length.
Extreme length	632		540		18		390	
Body:								
Greatest height		13		11		10		
Greatest width		9		11		8		
Width at vent				7		5½		
Height at ventrals		10½						
Height at vent		12		13		7½		
Snout to middle of vent				39		40		43
Head:								
Greatest length		21½		20½		21		20½
Distance from snout to nape		14½						
Width over eyes				9½		10½		
Greatest width over cheeks		9½		10½		12½		
Greatest height over cheeks				10		9		10
Width of interorbital area		4½						3½
Height over eyes				9		6½		
Length of snout		7		6				6
Length of operculum		5½		5½				
Length of postorbital portion of head				10½				10½
Length of maxillary		9½		9				
Length of mandible		10½		9½		11		
Distance from snout to orbit		7½						
Distance from snout to middle of pupil				8½		9		
Long diameter of eye		2		3½		ca. 4		4
Dorsal (spinous):								
Distance from snout		24		24½		26½		26½
Length of first ray						3		
Length of eleventh ray				5		5		
Length of twenty-fourth ray				5½		6½		
Length of fifty-fourth ray				5½		6		
Length of ninety-third ray				5½		5½		
Length of ray at end of tail				2½		2		
Length of longest ray		6½		5½		6½		
Anal:								
Distance from snout		41		42				
Length of first ray				2½		4½		
Length of twenty-fourth ray				4½		5½		
Length of sixty-fourth ray				6		5½		
Length of eighty-fifth ray				3½		3		
Length of longest ray		4½		6		5½		
Pectoral:								
Distance from snout		21½		20		22		
Distance of tip from snout				32		33½		
Length		12		12		11½		14
Ventral:								
Distance from snout		18		16		18		16
Length		2		3		2½		1½
Branchiostegals	5							
Dorsal			110		116-117			
Anal			97		91-93, 95			
Pectoral	23		20		19-20			
Ventral	3		3					

* Dansk. Vid. Selsk. naturvid. og math. Afh., Deel vii, 1838, p. 153, pl. v.

† Norges Fiske, 1875, p. 99.

The synonymy of the species stands as follows:

Lycodes VahlII Reinhardt.

Lycodes VahlII, REINHARDT, Kongelige Danske Videnskabernes Selskabs naturvidenskabelige og mathematisk Afhandl. vii, 1838, 153, tab. v.

GILL, Catalogue of the Fishes of the Eastern Coast of North America, 1861, p. 46; Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 260. (Sept.); Catalogue Fishes of East Coast of North America, 1873, p. 18.

GÜNTHER, Catalogue of the Fishes in the British Museum, iv, 1862, p. 319.

WASHINGTON, May 21, 1879.

LIST OF NAMES, AGE, TRIBE, &c., OF INDIAN BOYS AND GIRLS AT HAMPTON NORMAL AND AGRICULTURAL INSTITUTE, VIRGINIA, PLASTER CASTS OF WHOSE HEADS WERE TAKEN BY CLARK WILLS, ESQ., MARCH, 1879.

By Lieut. R. H. PRATT, U. S. A.

No.	Names.	Ago.	Tribe.	Where from.	Remarks.
			GIRLS.		
			DAKOTA.		
1	Josephine Malnourio	18	Gros Ventre ..	Fort Berthold Agency ..	Half white.
2	Sarah Walker	13	do	do	Do.
3	Carrie Anderson	12	Sioux	Yankton Agency ..	Do.
4	Anna Dawson	10	Arickaree ..	Fort Berthold Agency ..	Do.
5	Mary Kettle	16	Sioux	Yankton Agency ..	Full blood.
6	Ziewie	15	do	Crow Creek Agency ..	Do.
7	Rosa Pleets	15	do	Standing Rock Agency ..	Half white. Sister to No. 37.
8	Lizzie Spider	14	do	Yankton Agency ..	Full blood.
			BOYS.		
12	Oscar Brown	13	Sioux	Yankton Agency ..	Full blood.
13	E-corrupt-ta-ha	18	Mandan	Fort Berthold Agency ..	Do.
14	Joseph Winnebago	16	Sioux	Lower Brule Agency ..	Do.
15	Joseph Cook	19	do	Yankton Agency ..	Do.
16	Charley Stone	14	do	Crow Creek Agency ..	Do.
17	Ka What	12	Mandan	Fort Berthold Agency ..	One-fourth white. Brother to No. 35.
18	Louis Aygenoughwea	15	Sioux	Cheyenne River Agency ..	Full blood.
19	George Bushotter	15	do	do	Full blood.
20	Edwin Ashley	18	do	Crow Creek Agency ..	Do.
21	Karunach	16	Arickaree ..	Fort Berthold Agency ..	Half Sioux.
22	Daniel Chantaywahneechay ..	14	Sioux	Cheyenne River Agency ..	Son of Chief Little-no-heart. Full blood.
23	Tom Smith	14	Gros Ventre ..	Fort Berthold Agency ..	Half white.
24	A-lu-ka	20	Arickaree ..	do	Full blood.
25	Arihotehkish	13	Gros Ventre ..	do	Son of Chief Hard-horn. Full blood.
26	Charley Willis	18	Sioux	Yankton Agency ..	Full blood.
27	Leroy Shutaschney	14	do	Cheyenne River Agency ..	Do.
28	Charley Tah-tahn-kahskah ..	12	do	do	Son of White Bull. Brother to No. 29.
29	John D. Robb	17	do	do	Son of White Bull. Brother to No. 28.
30	Francis Rencountre	17	do	Lower Brule Agency ..	Full blood.
31	Mark-pia-monia	19	do	Crow Creek Agency ..	Do.
32	Henry Rencountre	18	do	Lower Brule Agency ..	One-fourth white.
33	Andrew Fox	16	do	Crow Creek Agency ..	Full blood.
34	Edmund Bishop	14	do	Yankton Agency ..	Do.
35	White Breast	18	Mandan	Fort Berthold Agency ..	One-fourth white. Brother to No. 17.
36	U-hah-ke-numpa	16	Sioux	Standing Rock Agency ..	Full blood.
37	John Pleets	18	do	do	Half white. Brother to No. 7.
38	Harry Brown	14	do	Cheyenne River Agency ..	Full blood.
39	Henry Fisherman	17	do	do	Do.
40	Frank Yellow-Bird	18	do	Yankton Agency ..	Do.
41	Samuel Wahminnyah Luzah ..	14	do	Cheyenne River Agency ..	Do.
42	Laughing Face	18	Arickaree ..	Fort Berthold Agency ..	Do.
43	George Deloria	15	Sioux	Yankton Agency ..	Do.
44	Samuel Four Star	19	do	do	Do.
45	Pamani	19	do	Crow Creek Agency ..	Do.
46	John Cadoete	18	do	Standing Rock Agency ..	Do.
47	Lezedeo Rencountre	16	do	Lower Brule Agency ..	One-fourth white.
48	Joseph Wahn	14	do	Crow Creek Agency ..	Half white.
49	James Wokasaka	17	do	Lower Brule Agency ..	Full blood.
50	David Simmons	13	do	Yankton Agency ..	Half white.

[For report of procuring these youth to come east for education, see page 173, Report of Indian Commissioner, 1878.]

R. H. PRATT,
First Lieutenant, Tenth Cavalry.

DESCRIPTION OF A NEW FISH FROM ALASKA (*ANARRHICHAS LEPTURUS*), WITH NOTES UPON OTHER SPECIES OF THE GENUS *ANARRHICHAS*.

By TARLETON H. BEAN.

The United States National Museum has received from Mr. Lucien M. Turner a species of *Anarrhichas*, which I at first hoped would prove to be the *orientalis* of Pallas.* It differs, however, widely from the description of that species, and does not correspond with any other known to me.

Two specimens of the Alaskan *Anarrhichas* were secured at St. Michael's in 1876. These are the first and only representatives of the genus from the Pacific in the Museum collection.

One of them, No. 21509, is 600 millimetres long; the other, No. 21510, is 495 millimetres. The lengths to the origin of the middle caudal rays are 555 and 455 respectively, and with these all the other measurements are compared.

DESCRIPTION.—The greatest height of the body (.20) is contained 5 times in the unit of length, and equals the distance of the dorsal from the end of the snout (.20). Its height at the pectorals (.17½) is contained 3 times in the distance of the anal from the snout (.52½). The least height of the tail (.04½) is contained twice in the length of the middle caudal rays (.09).

The greatest length of the head (.24) equals 1½ times its greatest height (.16), and is contained in the unit of length 4 times. The distance from the nostril to the anterior margin of the orbit (.015) is contained 3 times in the distance between the eyes (.045). The greatest width of the head (.11) is a little less than half its length, and is contained 9 times in the unit of length. The width of the interorbital area (.045) is about equal to the length of the snout (.04–.045). The length of the upper jaw (.13) equals 3 times the width of the interorbital area, and a little more than one-half of the length of the head. The maxillary extends to the perpendicular through the middle of the length of the head, the angle of the mouth being equally distant from the end of the snout and the end of the opercular flap.

The length of the mandible (.145) nearly equals that of the pectoral (.15), and is contained 7 times in the unit of length. The mandible extends to a point about equally distant from the end of the snout and the origin of the dorsal. There are four large canines in the upper jaw and five in the lower, all of them strongly recurved. Behind the canines in each jaw are a few short, sharp, conical teeth, also recurved. The palatines are in two rows, 4 teeth in the outer and 5 in the inner series. The teeth of the outer series are much the longer. Vomerine teeth ten, in two series. The vomerine patch begins in advance of the palatines, and

* Zoög. Rosso-Asiatica, iii, 1831, p. 77.

extends farther back than the latter. The length of the palatine series is to that of the vomerine as 16 to 27.

The distance from the snout to the orbit (.05-.055) is contained nearly or quite 4 times in that from the snout to the origin of the dorsal. The long diameter of the eye (.035) equals one-seventh, or slightly more than one-seventh, of the length of the head, and not quite one-fourth of the length of the lower jaw.

The distance between the end of the snout and the origin of the dorsal (.20) is contained 5 times in the unit of length, and equals twice the length of the longest dorsal ray (.10).

The distance of the anal from the snout (.52) equals 3 times the height of the body at the pectorals. The length of the first anal ray (.035) equals the long diameter of the eye (.035). The longest anal ray (.05-.055) equals a little less than half of the width of the body, and less than one-fourth of the length of the head. The vent is about midway between the end of the snout and that of the dorsal, and under the 25th to the 27th dorsal rays.

The length of the middle caudal rays (.085) is contained twice in the height of the body at the pectorals, and equals twice the least height of the tail. The caudal is rounded.

The distance of the pectoral from the snout (.23) is contained $4\frac{1}{3}$ times in the unit of length, and the length of the pectoral (.15) is contained $6\frac{2}{3}$ times. The extended pectoral reaches to the perpendicular through the origin of the 16th dorsal ray.

Radial formula: D. 81; A. 50-53; C. 20-21; P. 21.

Scales: Head and fins scaleless. The median line of the body and the whole of the tail are covered with small widely-separated scales, resembling those of *Lota*, but not depressed.

Color: The prevailing color of the alcoholic specimens is dark brown, without bands and spots. The belly is light brown or gray, clouded with very dark brown.

Anarrhichas lepturus needs to be contrasted only with *A. orientalis* and *A. lupus*. It seems to me improbable that any species of *Anarrhichas* can be safely identified with *orientalis*. The description of that species is certainly insufficient, and may be erroneous. The total length, for example, is stated to be 2 feet 2 inches, English measure; the length of the head, 11 inches—a proportion which is without a parallel in the other species of the genus. Assuming that the length of the head is not correctly given, and that it bears the same proportion to the total length as that of *A. lepturus*, it still differs from the latter in (1) the absence of scales, (2) the situation of the nostril midway between the eye and the mouth, (3) its radial formula—D. 84; C. 17—(4) the presence of 6 canines in the upper jaw. We must, however, accept the description as it stands, for the measurements are evidently those intended by the author, in which event the length of the head alone will serve to distinguish *orientalis* from all other species.

A. lepturus is distinguished from *A. lupus* by (1) its uniform brown color, (2) its scanty squamation, (3) its slender tail, (4) its greater number of dorsal and anal rays. It resembles *A. lupus* in many respects, but differs from it as widely as *lupus* does from *latifrons*.

In the measurement tables which follow the hundredths of length are calculated from the total length without the caudal.

A key to the species of *Anarrhichas* is given. In this no reference is made to the *denticulatus* of Kröyer, because the slight descriptions which we have of this species do not serve to distinguish it from *latifrons*. The species known on the American coast as *A. latifrons* is evidently the *latifrons* of Steenstrup* & Collett,† and I cannot see that it differs from the *denticulatus* of Günther‡ or of Kröyer.§

Table of Measurements.

Species: *Anarrhichas lepturus*.

Current number of specimen	21510.		21509.	
Locality	St. Michael's, Alaska.		St. Michael's, Alaska.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length	495		600	
Length to origin of middle caudal rays	455		555	
Body:				
Greatest height		20		19
Greatest width		13		
Height at base of pectorals		17½		17
Least height of tail		4½		4
Head:				
Greatest length		24½		23
Distance from nostril to anterior margin of orbit		1½		1½
Greatest width		12		10½
Width of interorbital area		4½		4½
Length of snout		4		4½
Greatest height		16		15½
Length of upper jaw		12½		13½
Length of mandible		14½		14½
Distance from snout to orbit		5		5½
Diameter of orbit		3½		3½
Dorsal:				
Distance from snout		20		20
Greatest height		6		
Length of longest ray		10		
Anal:				
Distance from snout		52½		52
Length of first ray		3½		
Length of longest ray		5½		5
Caudal:				
Length of middle rays		9		8
Pectoral:				
Distance from snout		23		23½
Length		15		15
Dorsal	81		81	
Anal	50		53	
Caudal	21		20	
Pectoral	21		21	

*Noget om Slegten Søulv &c., 1876, p. 43 (Vidensk. Medd. fra den naturhistoriske Forening i Kjöbenhavn, 1876, p. 201, tab. iii, figs. 3, 3', & 3'').

†Chra. Vidensk.-Selsk. Forhandl. 1879, No. 1, p. 46, pl. ii, fig. 2.

‡Cat. Fish. Brit. Mus. iii, 1861, p. 211.

§Gaimard, Voy. en Seand. etc., Zool., Poiss., pl. xii, fig. 1 (no description).

Table of Measurements—Continued.

Species: *Anarrhichas lupus*.

Current number of specimen.....	23364 a.		23364 b.	
Locality	Lat. 42° 50' N. Lon. 65° 50' W., 85 fth.		Lat. 42° 50' N. Lon. 65° 50' W., 85 fth.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length	107	.....	123½	.....
Length to origin of middle caudal rays.....	94	.....	109	.....
Body:				
Greatest height	19	20	22	20
Greatest width	12	12½	13	12
Height at base of pectorals	19	20	22	20
Least height of tail	4	4½	6	5½
Head:				
Greatest length	25	26½	28½	26
Greatest width	13	14	13½	12½
Width of interorbital area	5	5½	5	4.6
Length of snout	4	4½	5	4.6
Teeth .....	(*)	.....	(*)	.....
Length of upper jaw	13	14	14	13
Length of mandible	14	15	15	14
Distance from snout to orbit	6½	7	6½	6
Long diameter of eye	8	8½	8	7½
Dorsal:				
Distance from snout	24	25½	24	22
Greatest height	6½	7	8	7½
Length of first ray	6	6½	7	6½
Length of longest ray	10	10½	12	11
Anal:				
Distance from snout	53	56½	59	54
Length of first ray	3½	4	4	3½
Length of longest ray	6½	7	8	7½
Caudal:				
Length of middle rays	13	14	14½	13½
Pectoral:				
Distance from snout	24	25½	27	25
Length	17	18	19	17½
Branchiostegals.....	VII	.....	VII	.....
Dorsal	75	.....	75	.....
Anal	45	.....	46	.....
Caudal	21	.....	21	.....
Pectoral	19	.....	20	.....

* The vomerine series extends farther back than the palatines.

Table of Measurements—Continued.

Species: *Anarrhichas lupus*.

Current number of specimen	22249.		17419.		23005.		† 14900.	
Locality	Ipswich Bay, Massachusetts.		Bergen, Norway.		Christiania Fjord, Norway. R. Collett.		Coxswain's Ledge, July 25, 1874.	
	Milli-metres.	100ths of length.	Milli-metres.	100ths of length.	Milli-metres.	100ths of length.	Milli-metres.	100ths of length.
Extreme length	380	.....	570	.....	639	.....	1110	.....
Length to origin of middle caudal rays	345	.....	522	.....	585	.....	1020	.....
Body:								
Greatest height		19½		19		21½		24½
Greatest width		9½		9		.....		10½
Height at base of pectorals		18		18		19½		21½
Least height of tail		5		5		4½		5
Head:								
Greatest length		24		23		22½		24½
Distance from nostril to anterior margin of orbit		2		2½		2		2
Greatest width		13		11½		10		11½
Width of interorbital area		3½		4½		4½		6
Length of snout		4½		5½		4½		5½
Greatest height		17		18		19		20½
Length of upper jaw †		12		11½		10½		12½
Length of mandible		13		12½		12½		14½
Distance from snout to orbit		6½		7		6½		6½
Long diameter of eye		5		3½		3½		3
Dorsal:								
Distance from snout		22		21		19½		21
Greatest height		6½		.....		7		.....
Length of longest ray		10		12		10½		12½
Anal:								
Distance from snout		50		50		49½		52
Length of first ray		5		.....		3		4½
Length of longest ray		7		7½		5½		6
Height at last ray .....		.....		.....		3½		.....
Caudal:								
Length of middle rays		10		9½		9½		9
Length of external rays .....		.....		.....		8½		8½
Pectoral:								
Distance from snout		23½		22½		22		*22
Length		15		15		14½		14½
Branchiostegals .....		.....		.....	VI	.....		.....
Dorsal	74	.....	73	.....	74	.....	72	.....
Anal	46	.....	47	.....	48	.....	44	.....
Caudal	20	.....	20	.....	20	.....	.....	.....
Pectoral	20	.....	20	.....	20	.....	21	.....

* The pectoral extends to the 14th dorsal ray.

† These measurements are taken from a cast.

‡ In No. 17419 the vomerine teeth extend farther back than the palatine.

Table of Measurements—Continued.

Species: *Anarrhichas latifrons*, Stp.

Current number of specimen.....	Collett's measurements, Chra. Vid.- Selsk. Forh. 1879, No. 1, p. 51.		21845.	
Locality.....	Öxfjord, West Finmark.		Banquerean.	
	Milli- metres.	100ths of length.	Milli- metres.	100ths of length.
Extreme length.....	656		1108	
Length to origin of middle caudal rays.....	608		1048	
Body:				
Greatest height.....	145	23.85	255	24.33
Greatest width.....			97	9.25
Distance of anus from snout.....	318			
Height at anal origin.....	130	21.38	239	23
Least height of tail.....	21	3.45	44	4.19
Head:				
Greatest length.....	120	19.74	192	18.32
Greatest width.....	78	12.83	116	11.05
Width of interorbital area.....	29	4.78	57	5.44
Length of snout.....	34	5.59	68	6.49
Length of postorbital part of head.....	75			
Length of upper jaw*.....	57	9.37	101	9.64
Length of mandible.....			111	10.59
Distance from snout to centre of orbit.....	44	7.24	85	8.11
Diameter of eye.....	20	3.29	27	2.58
Dorsal:				
Distance from snout.....	116	19.08	205	19.56
Length of base.....			875	
Length of first ray.....			22	2.10
Length of longest ray (63d).....			68	6.49
Anal:				
Distance from snout.....			590	56.30
Length of base.....			455	
Length of first ray.....			20	1.91
Length of longest ray (38th).....			52	4.96
Caudal:				
Length of middle rays.....	48	7.89	60	5.73
Length of external rays.....			53	5.06
Pectoral:				
Distance from snout.....	136	22.37	220	21
Length.....	75	12.34	126	12.02
Dorsal.....	77		ca. 77	
Anal.....	45		46	
Caudal.....	18		17	
Pectoral.....	22		20	

* The palatine series of teeth in No. 21845 extends much farther back than the vomerine and is nearly or quite twice as long as the latter.

KEY TO THE SPECIES OF THE GENUS *Anarrhichas*.

A. Banded species.

b. Bluish gray, with 9-12 darker cross-bands. Vomerine teeth extend farther back than the palatine..... LUPUS.

bb. Greenish, with 14 deep green cross-bands; operculum having a green or blue spot; head, back, and sides above mingled bluish and red. Height of body contained about $5\frac{2}{3}$ times in its length..... FASCIATUS.

A A. Species without bands.

c. Spotted (in life).

d. Many large, round, black spots. Vomerine teeth extend nearly or quite as far back as the palatine..... MINOR.

- dd.* Brown, obscurely spotted with darker. Vomerine teeth do not extend nearly so far back as the palatine.....LATIFRONS.*
- cc.* Unicolored.
- e.* Brown; D. 84; C. 17; scales none; rostril midway between eye and mouth; head contained $2\frac{1}{3}$ (!) times in total length; 6 canines in upper jaw.....ORIENTALIS.
- ee.* Dark brown; vomerine series longer than palatine, and extends farther back; D. 81; C. 20-21; scales few; nostril nearer eye than mouth; head contained $4\frac{1}{3}$ - $4\frac{2}{3}$ times in total length; 4 canines in upper jaw.....LEPTURUS.

A partial synonymy of the species is appended:

1. *Anarrhichas lupus* LINNÉ.

Anarrhichas lupus LINNÉ, Syst. Nat., I, 1766, p. 430: DEKAY, Nat. Hist. N. Y., Fishes, 1842, p. 158, pl. xvi, fig. 43.

Anarrhichas vomerinus STORER, Hist. Fish. Mass., 1867, p. 99, pl. xviii, fig. 1.

2. *Anarrhichas minor* Olafsen.

Anarrhichas minor OLAFSEN, Reise i Island, 1772, § 683*b*, p. 592, tab. 42.

Anarrhichas pantherinus ZUIEW, Nov. Act. Petrop., 1781, p. 271, tab. *b*.

Anarrhichas leopardus AGASSIZ in SPIX, Pisc. Bras., 1829, p. 92, tab. ii.

3. *Anarrhichas orientalis* Pallas.

Anarrhichas orientalis PALLAS, Zoog. Rosso-Asiat., 1831, p. 77, tab. xi.

4. *Anarrhichas latifrons* Steenstrup & Hallgrímsson.

Anarrhichas latifrons STP. & HALLGR., Förh. Skand. Naturf., 3die Møte, 1842, p. 647: COLLETT, Chra. Vid. Selsk. Forh., 1879, No. 1, p. 46, pl. ii.

Anarrhichas (Lycichthys) latifrons GILL, Baird's Ann. Rec. S. & I. for 1876 (1877), p. clxvii.

? *Anarrhichas denticulatus* KRÖYER, Overs. Vidensk. Selsk. Kjöbenhavn, 1844, p. 140: GAIMARD, Voy. en Scand., etc., Zool., Poiss., 1845, pl. 12.

5. *Anarrhichas fasciatus* Bleeker.

Anarrhichas fasciatus BLKR., Nederlandsch Tijdschrift voor de Dierkunde, Amsterdam, Deel iv, 1874, p. 151.

U. S. NATIONAL MUSEUM, October 25, 1879.

NOTES ON CERTAIN TYPICAL SPECIMENS OF AMERICAN FISHES IN THE BRITISH MUSEUM AND IN THE MUSEUM D'HISTOIRE NATURELLE AT PARIS.

By DAVID S. JORDAN, M. D.

In a recent visit to Europe the writer has had the privilege of examining the original types of certain species of American fishes, described

* *Anarrhichas latifrons* and *A. denticulatus* are made the type of a distinct subgenus by Professor Gill, who proposes to separate these from the *lupus* type by the following characters: The greater convexity and longitudinal arching of the skull at the posterior frontal region, and the much greater extension backwards of the palatine series of teeth as compared with the vomerine band. Examination of the large collection of the three Atlantic species of *Anarrhichas* in the National Museum has convinced me that these characters have not the taxonomic value claimed for them, owing to their great variability in individuals. The figures published by Steenstrup (Vid. Medd. naturh. For. Kjob., 1876, tab. iii) represent extremes of *A. minor* and *A. latifrons*, which, without access to many examples of both species, would be misleading. *A. minor*, for instance, sometimes has the vomerine band of teeth extending little farther back than is observed in *A. latifrons*. The dentition of *A. latifrons*, too, is subject to considerable variation with age, as is the shape of the skull. *A. minor* seems to show closer affinity to *A. latifrons* than to *A. lupus*.

by Dr. Albert Günther from specimens in the British Museum, and by Cuvier, Valenciennes, and others from examples in the Museum at Paris. Notes on some of these, the proper identification of which may affect our nomenclature, are here presented.

1. *Micropterus dolomieu* Lacépède.

Lacépède, Histoire Naturelle des Poissons iv, 324.

The original type of this species is a large specimen, still in good condition. Its peculiarity, which led to its separation from "*Labrus*" by Lacépède, is that the last rays of the dorsal are detached from the others, and somewhat distorted, the result of some accident to the fish while young. The injury to the specimen is therefore not a museum mutilation, as I had heretofore understood, but a healed wound. This specimen belongs to the southern variety of the small-mouthed Black Bass, recognized by me (Bull. U. S. Nat. Mus., xii, 1878, p. 30) as *Micropterus salmoides* var. *salmoides*. Prof. Vaillant recognizes this form provisionally (MSS. Mission Scientifique au Mexique) as a distinct species (*Micropterus dolomieu* Lac.) from the northern form, but the differences seem to me to have no more than varietal value.

As shown below, there is little doubt that the specific name *dolomieu*, is the first ever distinctly applied to our small-mouthed Black Bass, as the name *Micropterus* is its earliest generic appellation. Unless we adopt the earlier *salmoides*, its name should, therefore, be *Micropterus dolomieu*.

On the other hand it is true that the name *Micropterus dolomieu* was applied to a deformed specimen, which was considered as a distinct genus and species solely on account of its deformity.

It is an established rule of nomenclature (Dall, Rept. Comm. Zool. Nomenc., 48,) that "a name should be rejected * * * when it expresses an attribute or character positively false in the majority or the whole of the group in question, as in cases (among others) when a name has been founded on a monstrous, abnormal, immature, artificial, or mutilated specimen."

The name *Micropterus* was founded on a monstrous specimen; in the sense intended by its author it expresses a false character, although the species really have smaller fins than are found in related genera. In the opinion of some writers it should be set aside and the next name in order (*Calliurus* Raf.) should be adopted in its stead. The species might then stand as *Calliurus dolomieu*. The specific name "*dolomieu*" is also open to objection, as it is a French noun having neither a Latin nor a genitive form, but being an unmodified name of a person. This hardly seems to me a reason for rejecting the name, although, if retained, it should receive a genitive form, as *dolomii*, or *dolomieii*.

The question of the adoption of the name *Micropterus* is still an open one. The weight of authority is, however, at present in favor of its retention, and the writer sees no sufficient reason for setting it aside.

2. *Grystes salmoides* Cuvier & Valenciennes.*Labrus salmoides* Lacépède, Hist. Nat. des Poiss. III, 716.*Grystes salmoides* Cuv. & Val., Hist. Nat. des Poiss. III, 54, pl. 46.

It seems rather a thankless task to reopen the question of the proper nomenclature of the Black Bass, but it is evident that we have not yet reached the bottom. The name *Micropterus salmoides* is now generally adopted in America as the proper name of the small-mouthed Black Bass, not only among naturalists, but among anglers and sportsmen as well. In the Museum at Paris, however, the same name is fully adopted for the large-mouthed Black Bass. Let us inquire into the history of the use of the name *salmoides*.

In 1800, the name *Labrus salmoides* was given by Lacépède to a fish inhabiting the waters of Carolina, and known to Americans as "Trout." This fish was known to Lacépède only through a drawing and manuscript description by Bosc. Both species of Black Bass occur in Carolina, the large-mouth most abundantly. Neither drawing nor description is exact enough to enable us to tell with certainty, or even with reasonable probability, which species was meant by Bosc and Lacépède. It is unlikely that Bosc discriminated between them at all, both being alike "Trout" to the Carolina fishermen. In the figure the mouth is drawn large, and if we *must* choose, the large-mouth is best represented.

The specific name *salmoides* next appears in the great work of Cuvier & Valenciennes (III, p. 54) as *Grystes salmoides*. The description here given is for the most part applicable to both species; the small size of the scales ("il y en a quatre-vingt-dix sur une ligne longitudinale et trente-six ou quarante sur une verticale"*) and the naked preoperculum render it evident that at least that part of the description was taken from a small-mouth, while the accompanying figure more resembles the large-mouth.

We are, however, not here left in doubt. The original material of the French naturalists is still preserved in the museum. It consists of the following specimens as described by Cuvier and Valenciennes:

1. "Nous avons reçu, par M. Milbert, un individu de huit à neuf pouces et un de six à sept. C'est ce dernier qui a six rayons à la membrane des ouies et quatorze rayons sous à la dorsale."

From one of these specimens the figure in the *Histoire Naturelle des Poissons* (pl. 46) was taken.† This specimen is unquestionably a large-mouthed Black Bass.

2. "Plus tard, M. Lesueur nous en a envoyé de la rivière Wabash un individu long de seize pouces, et trois autres qui n'en ont guère que cinq. Les jeunes sont d'un vert plus pale, et ont sur chaque flanc vingt-cinq à trente lignes longitudinales et parallèles brunes, qui paraissent s'effacer avec l'âge."

These specimens are still preserved, bearing the MSS. name of *Cichla variabilis* Le Sueur, and belong to the small-mouthed species. This

*The very small precaudal scales are doubtless here included.

†Fide Vaillant.

name, which, so far as I know, was never published by Le Sueur, is thus noticed by Cuvier and Valenciennes:

"M. Lesueur, croyant l'espèce nouvelle, en a publié une description dans le Journal des sciences à Philadelphie, sous le nom de *cichla variabilis*; mais nous avons tout lieu de croire que c'est ce poisson qui est représenté et décrit par M. de Lacépède (t. iv, p. 716 et 717, et pl. 5, fig. 2), sous le nom de *labre salmoïde*, d'après des notes et une figure fournies par M. Bose qui le nommait *perca trutte*. La figure en est un peu rude, mais la description s'accorde avec ce que nous avons vu, sauf quelques détails, qui tiennent peut-être moins au poisson même qu'à la manière dont il a été observé."

Later (vol. v, p. v), the type of *Micropterus dolomieu* was re-examined and fully identified by Cuvier as a *Grystes salmoides*.

It is thus evident that Cuvier and Valenciennes completely confounded the two species under the name *Grystes salmoides*, and that the uncertain *salmoides* of Lacépède became in their hands a complex species. We may perhaps say that their *salmoides* must be the fish described by them, and that the figure is to be taken into consideration only when other evidence is wanting. M. Vaillant, however, maintains that the large-mouthed species should be considered as the *salmoides* of Cuvier and Valenciennes, inasmuch as one of that species served as the type of their published figure.

The next writers who use the name *salmoides* (De Kay, Storer, etc.), have merely copied or echoed the description of Cuvier and Valenciennes, and have in no way given precision to the name.

Later Agassiz uses the name "*salmoneus*" (slip of the pen for "*salmoides*"?) apparently referring to the large-mouthed species.

The description given by Dr. Günther of *Grystes salmoides* in the Catalogue of the Fishes of the British Museum, I, 252, adds nothing to the precision of our knowledge of the species, the characters given being either taken from Cuvier and Valenciennes, or else common to both species.

Next a description is given of *Grystes salmoides* by Holbrook (Ich. S. Car., p. 28, pl. 4, f. 2), accompanied by an excellent figure, which leaves no possible doubt of the species intended. This is the large-mouthed Bass.

Omitting papers of lesser importance, we come finally to the very able discussion of these questions by Professor Gill (Proc. Am. Ass. Adv. Sci., 1873, p. 55-72), in which the whole subject is exhaustively treated, and the name *Micropterus salmoides* is definitely adopted for the small-mouthed Black Bass. This arrangement has been followed by most recent ichthyologists. In an important paper just now passing through the press (Mission Scientifique au Mexique), however, Messrs. Vaillant and Bocourt have adopted the name *Micropterus salmoides* for the large-mouthed species, for the reasons indicated above.

This question resolves itself into two. Is the specific name *salmoides* available for either species? and if so, for which?

Between the publication of the works of Lacépède and Cuvier both

species had been more than once described under different names by Rafinesque and Le Sueur. Of these names, *Lepomis pallidus* Raf. for the large-mouthed Black Bass, *Micropterus dolomieu* Lac. for the southern, and *Bodianus achigan* Raf. for the northern variety of the small-mouth have priority over the others. All these, therefore, antedate any precise definition of the name *salmoides*.

The question as to whether a specific name, at first loosely applied and afterwards precisely fixed, shall claim priority from its first use or not, has been differently answered by different writers, and has perhaps never been settled by general usage. I suppose that the amount of doubt or confusion arising from its use or rejection enters with most writers as an element. The name *salmoides*, left unsettled by Lacépède, has been generally received by writers, in consequence of the supposed precision given to it by Cuvier. We have seen, however, that both species were included by Cuvier under one name, and that we must look farther for real restriction of the species. The first distinct use of the name *salmoides* for any particular species is by Holbrook, for the large-mouthed form. On the basis of the first unquestionable restriction, the name, if used at all, must be applied to that species. Forty years previous to this restriction, however, the specific name *pallidus* was conferred on the same fish by Rafinesque.

In the writings of nearly all the older naturalists, as well as in many of the later ones, we find descriptions of species which are really generic in their value, and which, as our knowledge of species becomes greater, cannot be disposed of with certainty or even with any high degree of probability, for absolute certainty rarely accompanies any identification.

In the absence or impossibility of any general rule regarding such cases, the following supposed examples will illustrate what seems to the present writer a fair method of treating them.

Let us suppose that the genus *Micropterus* contains two well-marked species; that to one of these the name *salmoides* was early applied; that next the names *dolomiei* and *pallidus* were applied to the two respectively, and that *subsequently* the name *salmoides* was restricted to the one called *pallidus*.

Now if (1) the original *salmoides* were definitely a complex species, distinctly including both, we may hold its author to be a "conservative" writer, and that the subsequent restriction, like the restriction of a genus, is a change of view or the elimination of an error. In this case, the name *salmoides* should be retained, dating its priority from its original use, and applying to the species *pallidus*.

If (2) the original *salmoides* be not complex, but simply uncertain, the probabilities being undeniably in favor of its identity with *pallidus* rather than with *dolomiei*, it should be adopted instead of *pallidus*. Absolute certainty of identification cannot be expected of many names older than the present generation, and each writer must judge for himself of

the degrees of probability. If we may express it numerically, a probability of 75 per cent. should perhaps be sufficient, and this probability should be unquestionable—that is, not merely subjective and varying with the mental differences of the different writers.

If (3) the original *salmoides* be evidently a *Micropterus*, but hopelessly uncertain as to the species intended, it should claim priority from its first use for a definite species of *Micropterus*. If the name *pallidus* intervene between its first use and its final precise use, *salmoides* should become a synonym of *pallidus*, and should not be available for the other species. This rule is followed more or less consistently by most writers, and it seems to me a fair one. The revival of hopelessly uncertain ancient specific names in place of well-defined modern ones is productive only of confusion, and is open to gross abuse. The revival even of well-defined but forgotten names is confusing enough, and it has been strongly objected to by many writers.

If (4) the name *salmoides*, left hopelessly uncertain by its author, should have been definitely used for some species to which it might not improbably have referred *before* the use of the name *pallidus* for the same species, it should be retained, dating its acceptance from its second use, and the name *pallidus* should be considered as a synonym of *salmoides*.

If (5) the name *salmoides* should have been adopted by the second author supposed in (4) for some species not a *Micropterus*, or for some species which could not reasonably be identical with the original *salmoides*, the identification should be taken as an erroneous one, and should not be considered in our nomenclature.

The actual state of the name *salmoides* is that supposed under (3) above. I do not consider the name *salmoides* as rightfully entitled to priority over either *pallidus* or *dolomiei* as the specific name of a species of Black Bass. If it must be used, however, I think it wisest to retain it, with Professor Gill, for the small-mouthed species. For this purpose, we must consider the *salmoides* of Lacépède as complex, including both species. The case would then be that supposed by (1) above. We must hold further that Cuvier and Valenciennes restricted the name to the *small-mouthed* form. No possible settlement of the case can be free from question or objection. I propose to adopt the following view of the case, proposed by Dr. Gill (in *lit.*), to whom I have submitted the evidence above given.

Dr. Gill remarks:

"I think we can retain our old names (i. e. *Micropterus salmoides* and *Micropterus pallidus*) on the following grounds:

"(1) Let us admit that *Labrus salmoides* Lac. *may be* the small-mouthed.

"(2) The name *salmoides*, it may be considered, was re-established by Cuvier and Valenciennes for the largest specimen (the small-mouthed, according to your observations). The description was evidently based

on that, as appears from the number of scales, the absence of any on the preopercular limb ("le limbe de son préopercule [etc.] en manquant"), and the form of the dorsal. Even if it is certain that the figure was taken from a large-mouthed specimen, this would not affect the question, inasmuch as we must accept the description when that is definitive, and such is the case here.

"(3) It may be held that the name is further specialized by Cuvier and Valenciennes by its use to supersede the name of Le Sueur (p. 55), and as a substitute for M. Dolomieu (vol. v, p. 5).

"(4) The majority of the C. & V.'s specimens belonged to the small-mouthed Bass.

"(5) The figure was based on a large-mouth simply through accident of size and condition, not selected on account of exhibition of characters. In the same way, we might maintain that the type of *Pomotis vulgaris* C. & V. (although the description plainly points to *Eupomotis aureus*) was *Lepomis pallidus* [rather *auritus*], for the figure apparently represents such."

3. *Micropterus variabilis* Vaillant & Bocourt.

Cichla variabilis Le Sueur, MSS.

Micropterus variabilis Vaillant & Bocourt, MSS., Mission Scientifique au Mexique.

This is the ordinary northern small-mouthed Black Bass, *Micropterus achigan*, or var. *achigan* of authors, *Micropterus salmoides achigan* of the present writer.

4. *Bryttus unicolor* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 464.

A specimen collected by Le Sueur at Philadelphia, and doubtless the original type, seems to be the young of *Lepomis auritus*. Some of the specimens labelled *Pomotis vulgaris* are likewise *Lepomis auritus*. From one of these the figure of the species was apparently taken.

5. *Bryttus punctatus* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 462.

The types of this species (Charleston, Holbrook Coll.) belong to the species recently described by Prof. Cope as *Lepomis apiatus* (Proc. Am. Philos. Soc., 1877) and by me as *Lepiopomus apiatus* (Bull. U. S. Nat. Mus. x, 1877, 25). This species should therefore stand as *Lepomis punctatus*.

6. *Bryttus reticulatus* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 463.

This species is unquestionably identical with the preceding.

7. *Pomotis holbrooki* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 466.

This species is the *Pomotis speciosus* of Holbrook, *Pomotis microlophus* Günther. It should therefore stand as *Eupomotis holbrooki*. *Xystroplites longimanus* Cope, is at least very similar, as also *Pomotis pallidus* Ag.

8. *Pomotis catesbyi* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 469.

As commonly supposed, this species is *Eupomotis aureus* (*Pomotis vulgaris* C. & V.).

9. *Pomotis ravenelii* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 469.

This species is an *Eupomotis*, probably *aureus*, as supposed by me (Bull. U. S. Nat. Mus. x, 38), but the types are too far decayed for certain identification.

10. *Pomotis gibbosus* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 467.

The types of this species, as well as those of *Pomotis incisus* C. & V. (l. c. p. 446), belong to the species called by me *Lepomis pallidus*.

11. *Pomotis solis* Cuvier & Valenciennes.

Hist. Nat. des Poiss. vii, 468.

Only the Philadelphia specimens seen. These are badly decayed, but probably belong to *Eupomotis aureus*.

12. *Plesioperca anceps* Vaillant.

(Nouvelles Archives du Muséum d'Hist. Naturelle, tome 9, p. 37, 1873.)

As already supposed by the present writer, this species is the *Hadrop-terus nigrofasciatus* Agassiz.

13. *Esox depreandus* Le Sueur.

(Le Sueur MSS., Cuv. & Val. Hist. Nat. des Poiss. xviii, 336.)

The type of this species, a large stuffed skin, is an ordinary *Esox lucius* L. The cheeks, as usual, are scaly; the opercles naked below.

14. *Leuciscus gardoneus* Cuv. & Val.

(Hist. Nat. des Poiss. xvii, 316; Günther Cat. Fishes Brit. Mus. vii, 258.

Chondrostoma gardoneum Cope, Trans. Am. Phil. Soc. 1866, 393.)

The single typical specimen of this species agrees with *Notemigonus chrysroleucus* in most respects, differing chiefly in the short anal (9 or 10 developed rays). It must be referred to the genus *Notemigonus*, of which it possesses the carinated abdomen, backward dorsal, and the teeth 5-5, the edges of the grinding surface strongly crenate. If the specimen is normal, not an accident or hybrid, the species should stand as *Notemigonus gardoneus*. Professor Cope's statement, that the type of this species (also examined by him in Paris) is "identical with *Chondrostoma* in dentition and other characters," is not reconcilable with my ideas of the genus *Chondrostoma*.

15. *Leuciscus spiralingulus* Cuv. & Val.

Hist. Nat. des Poiss. xvii, p. 321, pl. 506.

The types are small specimens of *Luxilus cornutus* (Mitch.).

16. *Gobio cataractæ* Cuv. & Val.

Hist. Nat. des Poiss. xvi, 315, pl. 483.

The type of this species, as already supposed by me (Man. Vert. E. U. S., ed. 2d, p. 307), is the *Rhinichthys nasutus* of authors, which should

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therefore stand as *Rhinichthys cataractæ*. The teeth of the typical specimen have never been examined. The difference in the dentition of *Gobio* and *Rhinichthys* does not therefore affect the correctness of this identification.

17. *Leuciscus boucardi* Günther.

Cat. Fishes Brit. Mus. vii, 485.

The teeth of this species have a very narrow grinding surface. It is therefore probably referable to the genus *Myloleucus* as understood by me.

18. *Ceratichthys sallæi* Günther.

Cat. Fishes Brit. Mus. vii, 484.

As this species has no barbels, the propriety of its reference to *Ceratichthys* is not evident. It has the teeth 4-4 with grinding surface, and is therefore referable to the genus *Hudsonius* (*Hybopsis* Cope) as now understood by me.

19. *Ceratichthys cumingi* Günther.

Cat. Fishes Brit. Mus. vii, 177

This species is a true *Ceratichthys*, evidently closely related to *C. amblops*. It perhaps was not taken in California.

20. *Graodus nigrotæniatus* Günther.

Cat. Fishes Brit. Mus. vii, 485.

There are three typical examples of this species. The teeth of two of them were examined by Dr. Günther, and have, as stated by their describer, "pharyngeal teeth quite rudimental replaced by a somewhat uneven ridge of the bone." The third specimen, however, proved on examination to have developed teeth, of the ordinary sort, *two* on each *side*. Traces of the roots of similar teeth were visible on the other specimens, but in none were any evidences of the existence of a greater number. It is, therefore, possible that the normal number is 2-2. It is my opinion, however, that the teeth are normally 4-4, and that in these examples they have been lost, either by natural shedding or through the softening due to long preservation in spirits. If this view is correct, the genus *Graodus* should be suppressed. As the teeth are without grinding surface, the species should be referred to the genus *Oliola*, as understood by me, and should stand as *Oliola nigrotæniata*. If the teeth are normally 2-2, the genus *Graodus* should be retained.

The writer wishes to express his obligations to Dr. Günther for the permission to examine these and other specimens in the British Museum, and to Professors Vaillant and Sauvage for similar favors at the Museum at Paris.

OCTOBER 20, 1879.

LIST OF MARINE INVERTEBRATA FROM THE NEW ENGLAND COAST, DISTRIBUTED BY THE U. S. COMMISSION OF FISH AND FISHERIES.

SERIES I.

[Distributed in fifty sets, put up by Mr. Richard Rathbun, under the direction of Professor A. E. Verrill, 1879.]

EXPLANATION.

The specimens included in the following list are preserved in alcohol, unless otherwise stated. The authority given for the name is usually the author who first used the *combined binomial* name herein adopted, and is not necessarily that of the author who first described the species, or gave the *specific* name. (A name in parentheses is authority for the specific name only.)

The species are not all included in each of the fifty sets, but those sent in each numbered set are checked on the list bearing the corresponding number. The species now distributed are not to be considered as *the most common*, but simply those which happen to be at present most abundantly represented in the collections of the Fish Commission, or those which, for other reasons, can be most conveniently distributed at this time, and have been so selected as to give representatives of most of the important groups. It will also be understood that the species included in this list form but a very small proportion (less than one-twelfth) of the total number of species contained in the collections made by the Fish Commission on the New England coast.

PYCNOGONIDA.

1. Nymphon hirtum Fabr.
U. S. F. C.—Off Halifax, N. S., 52 fath., 1877.

2. Phoxichilidium maxillare Stimp.
U. S. F. C.—Casco Bay, shore.

MEROSTOMATA.

2a. Limulus Polyphemus Latr. Dry.
U. S. F. C.—Cape Cod Bay, shore, 1879.

CRUSTACEA.—DECAPODA.

2b. Gelasimus pugnax Smith.
U. S. F. C.—Cape Cod Bay, shore, 1879.

2c. Gelasimus pugnax Smith.
U. S. F. C.—New Haven, Conn., shore.

3. Gelasimus pugilator Latr.
U. S. F. C.—Vineyard Sound, Mass., shore.

3a. Callinectes hastatus Ordway.
U. S. F. C.—New Haven, Conn.

3b. Platyonychus ocellatus Latr. Young.
U. S. F. C.—Cape Cod Bay, surface, 1879.

4. Platyonychus ocellatus Latr.
U. S. F. C.—Vineyard Sound, Mass.

4a. Cancer borealis Stimpson. Dry
U. S. F. C.—Casco Bay, Maine, shore.

5. Cancer irroratus Say.
U. S. F. C.—Vineyard Sound, Mass.

5a. Cancer irroratus Say. Young.
U. S. F. C.—Gloucester, Mass., shore.

6. Hyas coarctatus Leach.
U. S. F. C.—Gulf of Maine, 22 to 44 fath.

7. Libinia emarginata Leach.
U. S. F. C.—Vineyard Sound, Mass.

8. Eupagurus pollicaris Stimp.
U. S. F. C.—Vineyard Sound, Mass.

9. Eupagurus pollicaris Stimp.
U. S. F. C.—Off Nantucket I.

9a. Eupagurus pollicaris Stimp.
U. S. F. C.—Off Noank, Conn.

10. Eupagurus pubescens Brandt.
U. S. F. C.—Coast of Maine, 20 to 34 fath.

11. Eupagurus bernhardus Brandt.
U. S. F. C.—Gloucester, Mass.

11a. Homarus Americanus Edwards.
U. S. F. C.—New Haven, Conn.

11*b*. *Homarus Americanus* Edwards.
U. S. F. C.—Vineyard Sound, Mass.

12. *Crangon vulgaris* Fabr.
U. S. F. C.—Massachusetts coast.

13. *Pandalus borealis* Kröyer.
U. S. F. C.—Mass. Bay, 40 to 55 fath.

14. *Pandalus Montagu* Leach.
U. S. F. C.—Mass. Bay, 42 to 50 fath.

15. *Hippolyte spina* Leach.
U. S. F. C.—Bay of Fundy, 10 to 20 fath.

CRUSTACEA.—SCHIZOPODA.

15*a*. *Thysanopoda inermis* Kröyer.
U. S. F. C.—Cape Cod, from whale stomach.

16. *Thysanopoda Norvegica* M. Sars.
U. S. F. C.—Bay of Fundy, surface.

17. *Mysis mixta* Lilljeborg.
U. S. F. C.—Mass. Bay, 40 to 50 fath.

CRUSTACEA.—CUMACEA.

18. *Diastylis quadrispinosus* G. O. Sars.
U. S. F. C.—Off Grand Menan I., 8 to 10 fath.

CRUSTACEA.—AMPHIPODA.

19. *Ptilocheirus pinguis* Stimp.
U. S. F. C.—Long I. Sd., off Noank, Conn.

19*a*. *Talorchestia longicornis* Smith.
U. S. F. C.—Cape Cod, shore, 1879.

20. *Gammarus locusta* Fabr.
U. S. F. C.—Gloucester Harbor, Mass.

CRUSTACEA.—ISOPODA.

21. *Idotea robusta* Kröyer.
U. S. F. C.—Vineyard Sound, Mass.

22. *Idotea irrorata* Edw.
U. S. F. C.—Vineyard Sd., Mass.

22*a*. *Æga psora* Kröyer.
U. S. F. C.—George's Bank, on cod-fish.

CRUSTACEA.—CIRRIPEDIA.

23. *Lepas fascicularis* Ellis and Sol.
U. S. F. C.—Vineyard Sound, Mass.

23*a*. *Balanus balanoides* Stimp. Dry.
U. S. F. C.—New Haven, Conn., shore.

23*b*. *Balanus balanoides* Stimp. Dry.
U. S. F. C.—Cape Cod Bay, shore, 1879.

ANNELIDA.—CHÆTOPODA.

24. *Lepidonotus squamatus* Leach.
U. S. F. C.—Bay of Fundy, 10 to 25 fath.

25. *Harmothoe imbricata* Malmg.
U. S. F. C.—Bay of Fundy, 10 to 25 fath.

26. *Nephtys cæca* Johnst.
U. S. F. C.—Gloucester, Mass., shore.

27. *Nephtys incisa* Malmgren.
U. S. F. C.—Off Vineyard Sd., 10 to 20 fath.

28. *Nereis pelagica* Linné.
U. S. F. C.—Vineyard Sd., 6 to 12 fath.

29. *Nereis virens* Malmgren.
U. S. F. C.—Gloucester, Mass., shore.

30. *Nothria conchylega* Malmgren.
U. S. F. C.—Gulf of Maine, 85 fath.

31. *Nothria opalina* Verrill.
U. S. F. C.—Gulf of Maine, 90 to 175 fath.

32. *Arabella opalina* Verrill.
U. S. F. C.—Vineyard Sd., 8 to 12 fath.

33. *Rhynchobolus dibranchiatus* Ver.
U. S. F. C.—Barnstable, Mass., shore.

34. *Sternaspis fossor* Stimp.
U. S. F. C.—Mass. Bay, 25 to 45 fath.

35. *Clymenella torquata* Verrill.
U. S. F. C.—Gloucester, Mass., shore.

36. *Thelepus cinnatus* Malmgren.
U. S. F. C.—Bay of Fundy, 10 to 30 fath.

37. *Potamilla reniformis* Malmg.
U. S. F. C.—Bay of Fundy.

37*a*. *Spirorbis lucidus* Möreh.
U. S. F. C.—Halifax, N. S.

38. *Spirorbis borealis* Daud.
U. S. F. C.—Gloucester, Mass., shore.

39. *Clitellio irrorata* Verrill.
U. S. F. C.—Gloucester, Mass., shore.

GEPHYRÆA.

40. *Phascolosoma cæmentarium* Quatr.
U. S. F. C.—Gulf of Maine, 40 to 100 fath.

40*a*. *Phascolosoma Gouldii* Dies.
U. S. F. C.—Salem and Barnstable, Mass.

CHÆTOGNATHA.

41. *Sagitta elegans* Verrill.
U. S. F. C.—Vineyard Sd., surface.

NEMERTINA.

42. *Lineus viridis* Verrill.
U. S. F. C.—Gloucester, Mass., shore.

42*a*. *Lineus viridis* Verrill.
U. S. F. C.—Eastport, Me., shore.

43. *Cerebratulus ingens* Verrill.
U. S. F. C.—Gloucester, Mass., shore.

44. *Cerebratulus roseus* Verrill.
U. S. F. C.—Gloucester, Mass., shore.

HOLOTHURIOIDEA.

45. *Pentacta frondosa* Jæg.
U. S. F. C.—Bay of Fundy, 10 to 40 fath.
45a. *Lophothuria Fabricii* Verrill.
U. S. F. C.—Grand Menan, N. B.
45b. *Lophothuria Fabricii* Verrill.
U. S. F. C.—Mass. Bay, 20 to 30 fath.
46. *Thyone Briareus* Selenka.
U. S. F. C.—Vineyard Sd., Mass.
46a. *Leptosynapta Girardii* Verrill.
U. S. F. C.—Cape Cod, shore, 1879.

ECHINOIDEA.

47. *Echinarachnius parma* Gray. Dry.
U. S. F. C.—Vineyard Sd., Mass.
48. *Strongylocentrotus Dröbachiensis*
A. Ag.
U. S. F. C.—Eastport, Maine.
49. *Strongylocentrotus Dröbachiensis*
A. Ag.
U. S. F. C.—Wood's Holl, Mass.
49a. *Strongylocentrotus Dröbachiensis*
A. Ag.
U. S. F. C.—Off Cape Cod, 20 to 40 fath., '79.
50. *Arbacia punctulata* Gray. Dry.
U. S. F. C.—Noank, Conn.
50a. *Arbacia punctulata* Gray. Dry.
U. S. F. C.—Wood's Holl, Mass.
50b. *Arbacia punctulata* Gray. Dry.
Young.
U. S. F. C.—Wood's Holl, Mass.
50c. *Arbacia punctulata* Gray.
U. S. F. C.—Vineyard Sd., Mass.

ASTERIOIDEA.

51. *Asterias vulgaris* Stimpson.
U. S. F. C.—Halifax, N. S.
51a. *Asterias vulgaris* Stimp.
U. S. F. C.—Eastport, Maine.
51b. *Asterias stellionura* Perrier.
U. S. F. C.—Off Nova Scotia, 90 to 110 fath.
52. *Asterias Forbesii* Verrill.
U. S. F. C.—Gloucester, Mass.
53. *Asterias Forbesii* Verrill. Dry.
U. S. F. C.—Vineyard Sd., Mass.
53a. *Asterias Forbesii* Verrill.
U. S. F. C.—Vineyard Sd., Mass.

54. *Leptasterias compta* Verrill.
U. S. F. C.—Off Watch Hill, R. I., 22 fath.
55. *Cribrella sanguinolenta* Lütken.
U. S. F. C.—Mass. Bay, Gulf of Maine.
55a. *Hippasteria phrygiana* Agassiz.
U. S. F. C.—Off Mass. Bay, 30 to 80 fath.,
1878-'79.
56. *Ctenodiscus crispatus* D. and Kor.
U. S. F. C.—Mass. Bay, 40 to 50 fath.
56a. *Ctenodiscus crispatus* D. and Kor.
Dry.
U. S. F. C.—Mass. Bay, 40 to 50 fath.

OPHIUROIDEA.

57. *Ophiopholis aculeata* Gray.
U. S. F. C.—Bay of Fundy, 10 to 100 fath.
58. *Ophiopholis aculeata* Gray.
U. S. F. C.—Mass. Bay and Gulf of Maine,
10 to 100 fath.
59. *Ophioglypha Sarsii* Lyman.
U. S. F. C.—Mass. Bay, 20 to 125 fath.
59a. *Ophioglypha Sarsii* Lyman. Dry.
U. S. F. C.—Mass. Bay, 20 to 125 fath.
60. *Ophioglypha robusta* Lyman.
U. S. F. C.—Bay of Fundy.
60a. *Astrophyton Agassizii* Stimp.
U. S. F. C.—Eastport, Maine.
60b. *Astrophyton Agassizii* Stimp.
U. S. F. C.—Off Cape Cod, 25 to 35 fath., '79.
60c. *Astrophyton Agassizii* Stimp. Dry.
U. S. F. C.—Off Cape Cod, 25 to 35 fath., '79.

ANTHOZOA.

61. *Urticina nodosa* Verrill.
U. S. F. C.—Gulf of Maine, 50 to 175 fath.
61a. *Urticina nodosa* Verrill.
U. S. F. C.—Off Nova Scotia.
62. *Bolocera Tuediæ* Gosse.
U. S. F. C.—Gulf of Maine, 50 to 175 fath.
63. *Metridium marginatum* Edw. and H.
U. S. F. C.—Noank, Conn.
64. *Alcyonium carneum* Agassiz.
U. S. F. C.—Casco Bay, 10 to 60 fath.
64a. *Alcyonium carneum* Agassiz.
U. S. F. C.—Off Cape Cod, 25 to 35 fath., '79.

HYDROIDA.

65. *Obelia geniculata* Hincks.
U. S. F. C.—Vineyard Sd., Mass.

66. *Obelia dichotoma* Hincks.
U. S. F. C.—Casco Bay, Maine.
67. *Campanularia flexuosa* Hincks.
U. S. F. C.—Bay of Fundy.
68. *Sertularia cupressina* Linné.
U. S. F. C.—Nantucket Shoals.
69. *Sertularia argentea* Ellis and Sol.
U. S. F. C.—Long Island Sound.
70. *Sertularia pumila* Linné.
U. S. F. C.—Gloucester, Mass., low water.
71. *Hydrallmania falcata* Hincks.
U. S. F. C.—Bay of Fundy, 10 to 60 fath.
72. *Sertularella tricuspidata* Hincks.
U. S. F. C.—Bay of Fundy, 50 to 55 fath.
73. *Diphasia fallax* Agassiz.
U. S. F. C.—Bay of Fundy, 20 to 55 fath.
- 73a. *Diphasia fallax* Agassiz.
U. S. F. C.—Vineyard Sd., Mass.
74. *Globiceps tiarella* Ayres.
U. S. F. C.—Vineyard Sd., Mass.
- 74a. *Thamnocnida spectabilis* Agassiz.
U. S. F. C.—Noank, Conn.
75. *Halecium halecinum* Sweig.
U. S. F. C.—Long I. Sound, 8 to 12 fath.

CEPHALOPODA.

- 75a. *Ommastrephes illecebrosa* (Les.)
U. S. F. C.—Cape Cod Bay, 1879.
76. *Loligo Pealii* Lesueur.
U. S. F. C.—Vineyard Sd., Mass.
- 76a. *Loligo Pealii* Lesueur. Young.
U. S. F. C.—Vineyard Sd., Mass.

GASTROPODA.

77. *Fulgur carica* Conrad.
U. S. F. C.—Vineyard Sd., Mass.
78. *Neptunea decemcostata* Ad. Dry.
U. S. F. C.—Eastport, Maine.
79. *Buccinum undatum* Linné. Dry.
U. S. F. C.—Bay of Fundy.
80. *Tritia trivittata* H. and A. Ad. Dry.
U. S. F. C.—Vineyard Sd., Mass.
81. *Ilyanassa obsoleta* Stimpson. Dry.
U. S. F. C.—Vineyard Sd., Mass.
- 81a. *Ilyanassa obsoleta* Stimpson.
U. S. F. C.—Gloucester, Mass.
82. *Urosalpinx cinerea* Stimpson. Dry.
U. S. F. C.—Vineyard Sd., Mass.

83. *Purpura lapillus* Lamarek.
U. S. F. C.—Gloucester, Mass.
- 83a. *Purpura lapillus* Lamarek. Dry.
U. S. F. C.—Casco Bay, Maine.
84. *Anachis avara* Perkins. Dry.
U. S. F. C.—Vineyard Sd., Mass.
85. *Astyris lunata* Dall. Dry.
U. S. F. C.—Vineyard Sd., Mass.
86. *Lunatia heros* H. and A. Ad. Dry.
U. S. F. C.—Vineyard Sd., Mass.
- 86a. *Lunatia heros* H. and A. Ad.
U. S. F. C.—Vineyard Sd., Mass.
87. *Lunatia heros* H. and A. Ad.
U. S. F. C.—Gloucester, Mass.
88. *Littorina littorea* Menke.
U. S. F. C.—Gloucester, Mass.
- 88a. *Littorina palliata* Gould. Dry.
U. S. F. C.—Casco Bay, Maine.
89. *Littorina palliata* Gould.
U. S. F. C.—Gloucester, Mass.
- 89a. *Littorina rudis* Gould.
U. S. F. C.—Casco Bay, Maine.
90. *Lacuna vincta* Turton.
U. S. F. C.—Gloucester, Mass.
91. *Bittium nigrum* Stimpson. Dry.
U. S. F. C.—Vineyard Sd., Mass.
92. *Crepidula fornicata* Lam. Dry.
U. S. F. C.—Vineyard Sd., Mass.
93. *Crepidula plana* Say. Dry.
U. S. F. C.—Vineyard Sd., Mass.
94. *Crucibulum striatum* H. and A. Ad.
Dry.
U. S. F. C.—Vineyard Sound.

95. *Margarita helicina* Möll. Dry.
U. S. F. C.—Grand Menan.

96. *Acmæa testudinalis* Han.
U. S. F. C.—Casco Bay, Maine.
- 96a. *Trachydermon ruber* Carpenter.
U. S. F. C.—Eastport, Maine.

97. *Melampus lineatus* Say. Dry.
U. S. F. C.—Barnstable, Mass.

SCAPHOPODA.

98. *Entalis striolata* Stimpson. Dry.
U. S. F. C.—Eastport, Maine.

LAMELLIBRANCHIATA.

99. *Clidiophora trilineata* Carp. Dry.
U. S. F. C.—Vineyard Sd., Mass.

100. *Spisula solidissima* Gray. Dry.
U. S. F. C.—Vineyard Sd., Mass.
- 100a. *Spisula solidissima* Gray. Dry.
Young.
U. S. F. C.—Vineyard Sd., Mass.
101. *Spisula ovalis* Gould. Dry.
U. S. F. C.—Off Cape Ann, Mass.
- 101a. *Spisula ovalis* Gould. Dry.
U. S. F. C.—Grand Menan.
102. *Macoma sabulosa* Möreh. Dry.
U. S. F. C.—Mass. Bay and Gulf of Maine.
103. *Venus mercenaria* Linné. Dry.
U. S. F. C.—New Haven, Conn.
- 103a. *Venus mercenaria* Linné. Dry.
U. S. F. C.—Nantucket, Mass.
104. *Cyprina Islandica* Lam. Dry.
U. S. F. C.—Mass. Bay, Gulf of Maine.
105. *Astarte undata* Gould. Dry.
U. S. F. C.—Eastport, Me.
106. *Yoldia limatula* Woodw. Dry.
U. S. F. C.—Vineyard Sd., Mass.
107. *Yoldia thraciformis* Stimp. Dry.
U. S. F. C.—Mass. Bay, Gulf of Maine.
108. *Scapharca transversa* Ad. Dry.
U. S. F. C.—Vineyard Sd., Mass.
- 108a. *Modiola plicatula* Lamk.
U. S. F. C.—New Haven, Conn., shore.
109. *Modiola modiolus* Turton. Dry.
U. S. F. C.—Vineyard Sd., Mass.
- 109a. *Modiola modiolus* Turton. Dry.
U. S. F. C.—Gloucester, Mass.
- 109b. *Mytilus edulis* Linné.
U. S. F. C.—New Haven, Conn., shore.
110. *Pecten irradians* Lam. Dry.
U. S. F. C.—Vineyard Sd., Mass.
111. *Pecten tenuicostatus* Migh. Dry.
U. S. F. C.—Off Watch Hill, R. I., 22 fath.
- 111a. *Pecten tenuicostatus* Mighels.
U. S. F. C.—Off Watch Hill, R. I., 22 fath.
112. *Anomia aculeata* Gmelin. Dry.
U. S. F. C.—Casco Bay, Maine.
- 112a. *Ostrea Virginiana* Lister. Dry.
U. S. F. C.—New Haven, Conn.
113. *Venericardia borealis* Carp. Dry.
U. S. F. C.—Off Noank, Conn.
114. *Nucula proxima* Say. Dry.
U. S. F. C.—Buzzard's Bay and Vineyard
Sd.

115. *Mya arenaria* Linné.
U. S. F. C.—Guilford, Conn.
116. *Ensatella Americana* Verrill.
U. S. F. C.—Barnstable, Mass.
117. *Saxicava arctica* Desh.
U. S. F. C.—Casco Bay, Maine.
118. *Callista convexa* Ad. Dry.
U. S. F. C.—Vineyard Sd., Mass.
119. *Tottenia gemma* Perkins. Dry.
U. S. F. C.—Long Island Sd., with *Littori-
nella minuta* St.

TUNICATA.

120. *Ascidia mollis* Verrill.
U. S. F. C.—Gulf of Maine, 50 to 175 fath.
121. *Ascidiopsis complanata* Verrill.
U. S. F. C.—Bay of Fundy, shore to 50 fath.
122. *Molgula retortiformis* Verrill.
U. S. F. C.—Bay of Fundy, 10 to 25 fath.
123. *Molgula Manhattensis* Verrill.
U. S. F. C.—Vineyard Sd., Mass.
- 123b. *Molgula Manhattensis* Verrill.
U. S. F. C.—Cape Cod, outer shore, 1879.
124. *Glandula arenicola* Verrill.
U. S. F. C.—Vineyard Sd., 10 to 20 fath.
125. *Halocynthia partita* Verrill.
U. S. F. C.—Vineyard Sd., 3 to 12 fath.
126. *Halocynthia echinata* Verrill.
U. S. F. C.—Grand Menan, 1 to 40 fath.
127. *Halocynthia pyriformis* Verrill.
U. S. F. C.—Bay of Fundy, 1 to 45 fath.
128. *Boltenia Bolteni* (Linné).
U. S. F. C.—Eastport, Maine, 1 to 20 fath.
129. *Perophora viridis* Verrill.
U. S. F. C.—Vineyard Sd., 1 to 12 fath.
130. *Botryllus Gouldii* Verrill.
U. S. F. C.—Vineyard Sd., Mass., shore.
131. *Amorœcium pellucidum* Verrill.
U. S. F. C.—Vineyard Sd., Mass.
132. *Amorœcium stellatum* Verrill.
U. S. F. C.—Vineyard Sd., Mass.
133. *Amorœcium constellatum* Verrill.
U. S. F. C.—Off Nantucket, Mass.
134. *Leptoclinum albidum* Verrill.
U. S. F. C.—Vineyard Sd., Mass.
135. *Leptoclinum albidum*, var. *lute-
olum* Verrill.
U. S. F. C.—Vineyard Sd., Mass.

136. *Salpa Caboti* Desor.
U. S. F. C.—Vineyard Sd., Mass., surface.

BRACHIOPODA.

137. *Terebratulina septentrionalis* Gr.
U. S. F. C.—Casco Bay, Maine.
137a. *Terebratulina septentrionalis* Gr.
U. S. F. C.—Eastport, Maine, 1 to 60 fath.

POLYZOA or BRYOZOA.

138. *Crisia eburnea* Lamouroux.
U. S. F. C.—Gloucester Harbor, Mass.
139. *Tubulipora serpens* Flem.
U. S. F. C.—Vineyard Sound, Mass.
140. *Tubulipora Atlantica* Smitt.
U. S. F. C.—Bay of Fundy.
141. *Alcyonidium ramosum* Verrill.
U. S. F. C.—New Haven, Conn.
142. *Flustrella hispida* Gray.
U. S. F. C.—Gloucester, Mass., shore.
143. *Gemellaria loricata* Busk.
U. S. F. C.—Casco Bay, Maine.
143a. *Gemellaria loricata* Busk.
U. S. F. C.—Off Cape Cod, 20 to 40 fath.,
1879.
144. *Cellularia ternata* Johnst. (var.)
U. S. F. C.—Gulf of Maine, 10 to 45 fath.
145. *Caberea Ellisii* Smitt.
U. S. F. C.—Bay of Fundy, 1 to 20 fath.
146. *Bugula Murrayana* Busk.
U. S. F. C.—Nantucket Shoals, 8 to 12 fath.
147. *Bugula turrita* Verrill.
U. S. F. C.—Vineyard Sd. and off Nantucket Island.
148. *Mucronella nitida* Verrill. Dry.
U. S. F. C.—Vineyard Sd., Mass.

149. *Membranipora pilosa* Farre.
U. S. F. C.—Gloucester, Mass.

- 149a. *Membranipora pilosa* Farre.
U. S. F. C.—Gloucester, Mass., on algæ.

150. *Escharina Isabelliana* D'Orb. Dry.
U. S. F. C.—Vineyard Sound, Mass.

151. *Hippothoa hyalina* Smitt. Dry.
U. S. F. C.—Vineyard Sd., Mass.

152. *Lepralia Americana* Verrill. Dry.
U. S. F. C.—Gloucester, Mass., shore.

PORIFERA (SPONGES).

153. *Microciona prolifera* Verrill. Dry.
U. S. F. C.—Vineyard Sd. and Long I. Sd.

154. *Chalina oculata* Bowerb. Dry.
U. S. F. C.—Vineyard Sd., Mass.

- 154a. *Chalina oculata* Bowerb. Dry.
U. S. F. C.—Casco Bay, Maine.

155. *Suberites compacta* Verrill. Dry.
U. S. F. C.—Off Nantucket, Mass.

156. *Suberites compacta* Verrill.
U. S. F. C.—Off Nantucket I., Mass.

- 156a. *Suberites compacta* Verrill.
U. S. F. C.—Cape Cod Bay, 15 fath.

- 156aa. *Suberites compacta* Verrill. Dry.
U. S. F. C.—Cape Cod Bay, 15 fath.

157. *Cliona sulphurea* Verrill. Dry.
U. S. F. C.—Vineyard Sd., Mass.

158. *Tethya gravata* Hyatt.
U. S. F. C.—Buzzard's Bay, Mass.

159. *Tethya gravata* Hyatt. Dry.
U. S. F. C.—Buzzard's Bay, Mass.

160. *Raphiodesma lingua* Bow. Dry.
U. S. F. C.—Bay of Fundy, 10 to 60 fath.

OCURRENCE OF CHELURA TEREBRANS, A CRUSTACEAN DESTRUCTIVE TO THE TIMBER OF SUBMARINE STRUCTURES, ON THE COAST OF THE UNITED STATES.

By SIDNEY I. SMITH.

Upon the coast of Europe an Amphipod belonging to the genus *Chelura* has long been known, associated with the Isopod *Limnoria lignorum*, or "gribble" of English writers, in destroying the timber of all kinds of submarine structures. But, upon the coast of the United States, the *Chelura* has apparently escaped detection until very recently, and I

am not aware of any published notice of its occurrence, although *Limnoria* has been known for many years, and its ravages have often attracted attention. I have repeatedly made careful search for *Chelura* at many different points upon our eastern coast from New Jersey to Nova Scotia, and have examined many pieces of *Teredo*- and *Limnoria*-bored timber from other parts of the coast, but, until 1875, I was not able to discover an individual of the genus. In the summer of that year, while connected with the party of the United States Fish Commission at Woods Holl, Massachusetts, two small specimens of *Chelura* were discovered, associated with *Limnoria*, in a bit of wood scraped from one of the piles of the government wharf. A careful search was made upon the piles of several wharves in the neighborhood and among the government store of spar buoys, but no more specimens could be discovered, although *Limnoria* was found in abundance.

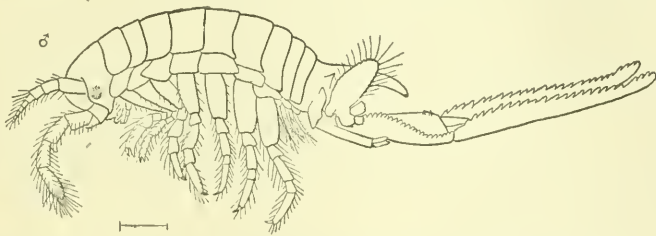


Figure 1.—*Chelura terebrans*; male; lateral view, enlarged about twelve diameters.

Without European specimens for comparison, these two individuals were scarcely sufficient to establish the identity of our species with the common species of Europe; and I delayed calling attention to the subject until more material should be discovered. No other specimens came to hand until August of the present year, when Professor Verrill discovered the species in abundance in old submerged piles at Provincetown, Massachusetts. The specimens found by Professor Verrill were all in wood submerged from 8 to 12 feet below the surface at low water, and were associated with *Limnoria lignorum* and *Teredo navalis*. The *Limnoria* occurred only sparingly, however, in this case, though it was found, by Mr. Sanderson Smith, in great abundance, with *Teredo navalis*, but without *Chelura*, in water-logged wood dredged the past summer in Cape Cod Bay in $7\frac{1}{2}$ fathoms. The specimens obtained by Professor Verrill exhibit all the variations due to age and sex, and show plainly that our species is identical with the European *Chelura terebrans*.

The species was first brought to notice by Philippi, who discovered it at Trieste, in company with *Teredo navalis*, in planks just taken from the sea, and who described and figured

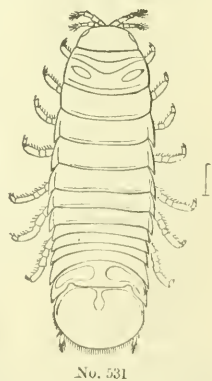


Figure 2.—*Limnoria lignorum*; dorsal view, enlarged ten diameters.

it in 1839. It was more fully described and figured by Allman, in 1847, from specimens found in the piles of the jetty in the harbor of Kingstown, near Dublin, Ireland. It has since been noticed at various points on the coast of Europe from Southern Norway to the Adriatic, and attention has often been called to its ravages.

There is apparently but one species of the genus known. The *C. pontica*, described by Czerniavski, in 1868, judging from the figures and the Latin part of the description, is not distinct. The figure which he gives of one of the abdominal swimming legs (pleopods) shows only one multi-articulate ramus, which is an evident inaccuracy in the drawing, and some other slight differences shown in the figures are apparently due to a similar cause. It is perhaps well to mention, in connection with this reference to Czerniavski's paper, a very remarkable paper published the same year by Eugene Hesse, in which this well-known European species is redescribed and extensively figured, from specimens taken on the coast of France, as a new species of *Limnoria*! The genus *Chelura* unquestionably belongs to the Amphipoda, and has been placed in that order and near *Corophium* by all carcinologists who have written upon the subject. It has, in fact, no structural features which ally it to the Isopoda, as distinguished from the Amphipoda, and it has no external resemblance to *Limnoria*, with which it need not be confounded by the most superficial observer.

The *Chelura* is readily distinguished from all the known genera of crustaceans by the structure of the three pairs of caudal stylets (uropods). The first (antepenultimate) pair of these appendages are slender and tipped with two small and nearly equal rami; the second have the dorsal edge of the basal portion expanded into a thin, broad, oval plate projecting beyond the two small rami which are attached in an emargination of the lower margin; the last pair have very stout but short bases, to each of which is articulated a single very long and strong ramus, which, in fully grown males, is nearly as long as the body of the animal, but much shorter in females and young. The length of fully grown male, from the front of the head to the ultimate pair of caudal stylets, is about a quarter of an inch (6^{mm}); that of the female somewhat less.

According to notes, made upon the specimens taken at Wood's Holl in 1875, the color of *Chelura* is very different from that of *Limnoria*, being semitranslucent, thickly spotted and mottled above with pink, somewhat as in *Unciola irrorata*, but wanting the opaque white of that species.

The following synonymy gives the bibliographical history of the species:

***Chelura terebrans* Philippi.**

Chelura terebrans Philippi, Archiv für Naturgeschichte, v, 1839, p. 120, pl. 2, fig. 5; Annals Nat. Hist., iv, p. 94, pl. 3, fig. 5, 1839.—Allman, Annals and Magazine Nat. Hist., xix, p. 361, pls. 13, 14, 1847 (see further under *C. destructor*).—White, Catalogue British Crust., p. 56, 1850; Popular History British Crust., p. 202, pl. 11, fig. 2, 1857.—Gosse, Marine Zoology, i, p.

Chelura terebrans—(Continued.)

- 138, fig. 250, 1855.—Bate, Report British Assoc. Adv. Sci., 1855, p. 59, pl. 13, fig. 3 (antenna), pl. 17, fig. 10 (integument), 1856; *Annals and Magazine Nat. Hist.*, II, xix, p. 150 (1857); *Catalogue Amphip. Crust. British Museum*, p. 285, pl. 48, fig. 1, 1862.—Bate and Westwood, *British sessile-eyed Crust.*, i, p. 503 (woodcut), 1863.—Heller, *Beiträge zur näheren Kenntniss der Amphipoden des Adriatischen Meeres* (*Denkschriften Math.-Naturwissensch. Classe Kaiserliche Akad. Wissenschaften*, Wien, xxvi), pp. 52, 61, 1866.—Boeck, *Crust. Amphipoda borealia et arctica* (*Christiania Videnskab.-Selskabs Forhandling for 1870*), p. 173 (253), 1870; *Skandinaviske og Arktiske Amphipoder*, p. 647, 1876.—Metzger, *Jahresbericht der Comm. zur wissensch. Untersuchung der deutschen Meere für 1872-1873*, Nordsee, p. 278, 1875.
- Nemertes nesawoides* Leach, White, *List Crust. British Museum*, p. 90, 1847 (*teste* White, *Catalogue British Crust.*, p. 56, 1850).
- Chelura destructor* Allman, loc. cit., p. 362, 1847 [provisionally proposed in case the Irish specimens prove distinct from Philippi's species].
- Limnoria xylophaga* Hesse, *Annales des Sci. nat., Zoologie*, V, x, p. 101, pl. 9, 1868.
- Chelura pontica* Czerniavski, *Materialia ad zoographiam Ponticam comparatam*, p. 95, pl. 7, figs. 1-18, 1868.
- NEW HAVEN, October 16, 1879.

DESCRIPTION OF NEW SPECIES OF NORTH AMERICAN FISHES.

By DAVID S. JORDAN.

1. *BOLEOSOMA VEXILLARE*, sp. nov.

Allied to *Boleosoma effulgens*. Body rather short and stout; caudal peduncle not contracted; head moderate, the muzzle somewhat decurved; eye moderate; gill membranes scarcely connected; cheeks and breast naked; opercles scaly; a naked strip in front of the dorsal fin; opercular spine moderately developed; *second dorsal very short and high*, higher than long; pectorals and ventrals not reaching to anal.

Coloration olivaceous, the sides with traces of vertical bars, probably greenish in life; male with the first dorsal, ventral, and anal black; second dorsal and caudal strongly barred with black and white in fine pattern; head black; female not seen, but probably without black. Lateral line complete. Scales very large, 4-35-6.

Head 4 in length to base of caudal; depth $4\frac{2}{3}$

Fin rays. Dorsal VIII-10; A. I., 7.

Length of type $2\frac{1}{2}$ inches.

This species differs from its relatives in the larger scales and the much shorter and higher second dorsal. (D. IX-13 in *B. effulgens*.)

The type was taken in the Rappahannock River at Warrenton, Va., by a correspondent of "Forest and Stream," and forwarded to me for identification by the editor of that journal, Mr. Charles Hallock.

2. NANOSTOMA VINCTIPES, sp. nov.

Allied to *Nanostoma zonale* (*Pœcilichthys zonalis*, Cope). Body fusiform, little compressed; head short, the snout strongly decurved; eye large, longer than snout, nearly 3 in head; mouth small, horizontal, the lower jaw included; teeth small, not distinguishable on the vomer and palatines; cheeks, opercles, neck, and throat closely scaled; opercular spine well developed; gill membranes broadly connected across the breast.

First dorsal rather low, with slender spines; second dorsal shorter and rather higher; the two well separated. Anal spines high, the first much the higher. Caudal moderate, subtruncate. Ventrals pointed, not reaching to the vent. Pectorals moderate, reaching rather beyond tips of ventrals.

Lateral line complete, with 45 scales in its course.

Color olivaceous, with about 8 obscure darker lateral shades or bars, with narrow paler interspaces. These bars meet around the body behind the vent, but not anteriorly; back with 6 darker quadrate shades. A dark streak downward and forward from eye, and some black markings in front of opercle. Fins all strongly cross-barred with darker, the pectorals and *ventrals* especially so; spinous dorsal reddish at base, with a blackish edging.

Fin rays, D. X-11; A. II, 7. Length of types about $2\frac{1}{2}$ inches.

This species differs from *N. zonale* in its less compressed body and in coloration. In the latter species the ventrals are plain and the lateral bars encircle the belly.

The types of this species, five in number, were taken in a tributary of Illinois River, at Naperville, Ill., by Dr. Ernest R. Copeland. One of these is in the U. S. National Museum, numbered 23454.

3. PŒCILICHTHYS VIRGATUS, sp. nov.

A slender species, resembling an *Etheostoma*, not closely related to any of the species thus far made known.

Body moderately elongate, subfusiform, compressed; the back somewhat elevated, the caudal peduncle rather deep; head long and rather pointed, little compressed, rather slender; the snout but little decurved; mouth rather large, somewhat oblique, the maxillary reaching to the pupil, the lower jaw scarcely shorter than the upper; teeth small, even, in several rows; eye rather large; gill membranes not connected. *Cheeks, opercles, neck, and breast wholly naked. Humeral region with an enlarged black scale-like process as in P. punctulatus, Ag., and in the species of Etheostoma.* Posterior border of preopercle obtusely but distinctly crenate-dentate. Scales rather large—53 in a longitudinal series, the lateral line distinct on about 20 of them.

Color greenish, each scale with a small blackish spot, these forming conspicuous lateral stripes as in *Etheostoma lincolatum*. Back and sides

with cross-blotches. Vertical fins faintly barred. Humeral scale large and black.

Head $3\frac{2}{3}$ in length without caudal; depth 5.

Fin rays, D. IX-10; A. II, 8.

Length of types 2 to $2\frac{1}{2}$ inches.

This species differs from its congeners in its form and coloration. From all except *P. lepidus*, B. and G., it is separated by its naked head. From all but *P. punctulatus*, Ag., by the black humeral process.

The numerous typical examples were taken by me in the Rock Castle River, at Livingston, Ky. Their resemblance to *Etheostoma flabellare* caused them to be overlooked until lately. One of these is in the U. S. National Museum (No. 23456). Another has been forwarded to the British Museum.

4. ZYGONECTES RUBRIFRONS, sp. nov.

Body moderately stout, little compressed, not elevated, the caudal peduncle deep; head rather long, broad between the eyes, flat above; eyes large, $3\frac{1}{2}$ in head, their range horizontal; mouth rather large. *Teeth small, nearly even, in a narrow band.* Scales moderate. Dorsal fin very short and small, placed a little behind the anal or about even with it, its position in the males rather more posterior; anal short, high in the males; ventrals very small; pectorals small.

Color, males dark olivaceous, with a dark, bronze-orange spot on each scale posteriorly, much as in *Xenisma catenatum*. Below these spots are bright orange. Faint orange, narrow vertical bars along the lower and posterior part of the body. Vertical fins with orange spots. Jaws and space in front of eyes bright orange-red; paired fins dusky. Females almost uniform brassy-olivaceous, without evident spots or red markings.

Head $3\frac{1}{4}$ in length to base of caudal; depth $3\frac{3}{4}$. D. 7 or 8; A. 8 or 9; lat. 1. 32; L. transv. 11 or 12; B. 5; L. $2\frac{1}{2}$ to 3 inches.

St. Sebastian River, Florida, the numerous types collected by Dr. J. A. Henshall. A larger species than most in the genus, and with the dorsal fin less posterior.

Some of these in the U. S. National Museum are numbered 23450.

5. ZYGONECTES HENSHALLI, sp. nov.

Body rather stout, deep and compressed, the profile nearly straight, the back little elevated, and the caudal peduncle short and deep; head moderate; mouth rather small; *jaws each with a series of long and rather slender canine-like teeth, followed by a band of small teeth*; the canines larger in the lower jaw; eye large; scales rather large; dorsal fin short and high, inserted slightly behind the anal in the males, exactly opposite it in the females; caudal large; anal fin larger and rather lower than dorsal; ventrals quite small; pectorals moderate.

General color olivaceous; sides covered, especially posteriorly, with rather large, irregularly placed orange spots, which also extend on the

vertical fins; dorsal dusky, with a dark bar; head without red; caudal and anal more or less yellow; females obscurely marked; young with diffuse greenish vertical bars.

Head $3\frac{1}{2}$ in length to base of caudal; depth $3\frac{1}{2}$. B. 5; D. 7 or 8; A. 10 or 11; lat. l. 33; L. transv. 10; L. 3 to $3\frac{3}{4}$.

San Sebastian River, Florida, where it is abundant, in company with *Jordanella florida*, *Zygocetes rubrifrons*, and other *Cyprinodonts*, the numerous types collected by Dr. J. A. Henshall. Some of these in the U. S. National Museum are numbered 23449. The largest species of the genus strongly resembling the preceding, from which it may be known by its dentition, its larger size, and the different coloration.

6. CERATICHTHYS LUCENS, sp. nov.

Allied to *Ceraticthys biguttatus* (Kirt.).

Body elongate, compressed, the back somewhat elevated from the occiput to the base of dorsal, thence rapidly declined to the long and slender caudal peduncle. Head short, compressed, the cheeks nearly vertical; interorbital space rather broad and flat, somewhat grooved; eye very large, circular, high up, placed nearly midway of the length of the head; its diameter about equal to the length of the snout, and scarcely greater than the width of the interorbital space. Preorbital bone large, oblong, conspicuous and silvery; suborbital bones rather narrow.

Mouth rather small, horizontal, the lower jaw included, the edge of the premaxillary below the level of the eye; the maxillary not reaching to the vertical from the front of the orbit. Barbel quite small. Snout boldly and abruptly decurved much as in *C. amblops* (Raf.), the tip of the snout thickened, forming a sort of pad.

Scales moderate, thin, and brightly silvery. Lateral line decurved in front, thence nearly straight; about 16 scales in front of the dorsal, 42 in the course of the lateral line; 5 series above and 4 below. Rows of scales along the back converging behind the dorsal where the upper series run out, as in *Luxilus cornutus*.

Fins rather higher and more falcate than in *Ceraticthys biguttatus*; the dorsal fin inserted well forward, directly over or slightly in advance of base of ventrals. Pectoral fins pointed, not reaching ventrals, the ventrals not reaching the vent.

Teeth 4-4, hooked, without grinding surface.

Color translucent greenish above; sides and below brilliantly silvery; eye white; cheeks and opercles with a bright silvery lustre; upper fins yellowish; lower unspotted; a slight plumbeous lateral shade, but no distinct markings anywhere either in large or small specimens.

Length of head contained $4\frac{1}{3}$ times in total length to base of caudal; greatest depth 4 times.

Dorsal rays, 1, 8; anal 1, 8.

Length of largest of typical examples $5\frac{1}{8}$ inches.

This species is described from three examples taken at the Falls of the Ohio. Two of these are now in my own collection; the third in the U. S. National Museum is numbered 23462.

This species is larger than the others of the genus except *C. biguttatus* and the Californian *C. symmetricus*, (Grd.). In coloration it differs widely from *C. biguttatus*, which species is wholly destitute of silvery lustre. Its head is likewise shorter and blunter, and the mouth smaller. The form of the body very different. From *C. amblops*, *C. rubrifrons*, etc., it differs in the number of teeth and in the smaller scales.

7. *LUXILUS ZONISTIUS*, sp. nov.

(*Codoma eurystoma* JORDAN & BRAYTON, Bull. U. S. Nat. Mus. xii, 42, 52; not *Photogenis eurystomus* JORDAN, Ann. Lyc. Nat. Hist. N. Y., 356, 1877.)

Allied to *Luxilus coccogenis*, Cope. Body rather stout, compressed, the back elevated at the base of the dorsal fin, thence rapidly declined, the caudal peduncle rather short and slender. Head short and rather thick; interorbital space broad and flat; cheeks nearly vertical. Length of head about equal to greatest depth of body, about 4 times in length to base of caudal. Eye large, longer than snout, about 3 in head, its diameter about equal to the interorbital space. Mouth comparatively large, oblique; in size intermediate between *L. coccogenis* and *L. cornutus*. Jaws about equal in the closed mouth. Premaxillary on the level of the pupil; maxillary reaching to opposite the front of the eye. Pre-orbital short and deep; suborbitals narrow.

Scales large, 6-43-3, closely imbricated on the sides of the body where they are much higher than long. Lateral line strongly decurved.

Fins moderate. Dorsal fin inserted somewhat behind the line of the ventrals, 1, 8, not much elevated. Anal longer than in the related species, 1, 10. Pectorals scarcely reaching ventrals; the ventrals reaching past the vent.

Teeth 2, 4-4, 2, hooked, with narrow grinding surface.

Color steel-blue above; sides somewhat silvery; dorsal fin with a conspicuous jet black cross-bar about half way up; a distinct round black spot at base of caudal, rather smaller than the eye, behind this a cream-colored area, a curved black bar at the shoulder behind and above the opercle; top of head and base of pectorals with dusky punctulations. Females and young specimens have these dark markings obscure. Males in spring have the dorsal cross-bar scarlet and more or less dull ferruginous; red on the head and caudal fin. The snout is covered with small tubercles in spring.

The types of this species, about 20 in number, ranging from 2 to 4½ inches in length, were taken in Suwannee Creek, a tributary of the Chattahoochee River in Northern Georgia.

A few young specimens of this species were mixed with the types of "*Photogenis*" *eurystomus*, Jor., a species which the present one somewhat resembles. The specimens referred to by Jordan and Brayton (l. c.) as *Codoma eurystoma* are the types of the present species. *Photogenis leu-*

copus Jordan & Brayton, Bull. U. S. Nat. Mus., XII, 41, is, I think, identical with "*Photogenis*" *eurystomus*. The teeth of genuine examples of the latter species are always 1, 4-4, 1. Those with the teeth 2, 4, all belong to *Luxilus zonistius*.

One of the typical examples of this species is numbered 23452 in the U. S. National Museum.

8. LUCANIA GOODEI, sp. nov.

Allied to *Lucania parva* (*Cyprinodon parvus*, Baird and Girard). Body elliptical, rather elongate, the back considerably elevated to a point just in front of the origin of the dorsal fin; the caudal peduncle rather deep and compressed; greatest depth contained 4 to $4\frac{1}{4}$ times in length to base of caudal. Head short, comparatively narrow, and bluntly pointed, its length contained $3\frac{3}{4}$ to $4\frac{1}{4}$ times in length of body. Mouth small, terminal, both jaws with rather large conical canine-like teeth, apparently in a single series. Eye large, near the middle of the side of the head, its diameter contained $2\frac{1}{2}$ to $2\frac{3}{4}$ times in the length of the head, about equal to the width of the interorbital space. Scales large, their exposed surfaces higher than long, in about 30 (29 to 32) longitudinal and 7 vertical series. Humeral scale like the others.

Fins large, especially in the males. Dorsal rays 9. Anal 9. Origin of dorsal about midway between snout and base of caudal, conspicuously in advance of anal. Height of dorsal fin in the males two-thirds the length of the head, about equal to the length of the base of the fin. In females a little lower. Anal fin similar and nearly as high and long, beginning nearly under the middle of the dorsal. Caudal moderate subtruncate. Ventrals long; in the males reaching the front of the anal; in the females reaching the vent. Pectorals reaching past front of ventrals in both sexes.

Color olivaceous, the scales with dark edgings. A very distinct black band in both sexes running through eye and snout straight to the base of the caudal, where it ends in a round black spot. This band is about as wide as a series of scales, although developed on parts of two series. A conspicuous black band in both sexes along the lower edge of the caudal peduncle, from the root of the caudal to the vent, dividing and passing on each side of the anal fin. Fins in the female plain. In the male basal half of dorsal and anal jet black, outer half pale with a black edge. Pectorals and especially ventrals also dark-edged. Caudal fin faintly mottled. Vertical fins with more or less red in life (*fide* Goode).

The typical specimens, about 30 in number, ranging from $\frac{3}{4}$ to $1\frac{1}{4}$ inches in length, were obtained in Arlington River, Florida, a tributary of the St. John's, by Prof. G. Brown Goode, in company with *Girardinus formosus*, *Zygonectes* (*Gambusia*) *arlingtonensis*. These are numbered 23505 on the register of the U. S. National Museum. The species is well separated from its congeners *renusta* and *parva* by its black lateral band and colored fins. From the former the fewer dorsal rays also distinguish it.

9. *XIPHISTER*, gen. nov. (Fam. *Xiphisteridae*).

(*Xiphidion* Girard, U. S. Pac. R. R. Expl. Fishes, 119; preoccupied in Orthoptera; *Xiphidium*, Serv.)

As the name *Xiphidion* or *Xiphidium* is preoccupied for a genus of Orthoptera, the name *Xiphister*, of similar etymology, is proposed as a substitute. The typical species *Xiphidion mucosum*, Girard, may be known as *Xiphister mucosus*.

ON THE MIGRATIONS AND NESTING HABITS OF WEST-COAST BIRDS.

By J. G. COOPER, M. D.

Uniformity in the dates of arrival of birds and laying eggs has usually been considered among the "constants of nature" in the temperate zone. Where the distinction of seasons is well marked, these events are among the most reliable phenomena connected with the climate, and exceptional dates are noted down with particular interest.

It has, however, been ascertained that there is much less uniformity in the habits of the same species within the tropics. There being no changes of temperature, the division into wet and dry seasons, where existing, can alone influence them. It does so by regulating the flowering and fruiting of trees, etc., on which the food of birds directly or indirectly depends (except in the case of aquatic species), the rapacious kinds following the vegetivorous in their search for food.

Even on the border of the temperate zone, in Arizona and Florida (probably also in Texas), an approach to the irregularity of tropical habits has been observed, some species laying eggs in autumn, at the end of the rainy season, and many abandoning the migratory habits seen northward.

In California we might expect to find similar conditions, because of the mildness of the winters in the less elevated regions, giving us an almost subtropical climate. But it can only have an effect south of latitude 34°, in the lower part of the Colorado Valley, if anywhere, sufficiently marked to cause the birds to lay in autumn, though its influence is seen to some extent in the wintering of several species farther north than on the east coast.

As far south as frost extends, which is south of San Diego and perhaps to Fort Yuma, the habits of the temperate zone prevail. At Tucson, Arizona, however, where Captain Bendire noticed eggs laid in autumn, the advantage of being about thirty miles south of Fort Yuma is compensated for by the elevation being 748 feet greater. The more barren, almost desert character of the country near Fort Yuma is probably the reason why such habits among the birds are not noticed, perhaps also because no observers have looked for them at the right season. The only peculiar climatic influence observable in California is therefore

dependent on the alternation of wet and dry seasons, which prevails in less degree along the whole coast northward.

It is indeed the excess of rain until quite late in spring, which appears to prevent the earlier laying of eggs by some species that begin to lay in the east earlier than on this slope. This is noticeable among Hawks and Owls, and may also be expected with the Crossbills, Waxwings, and others breeding farther north, but of which no records exist for this coast. North of latitude 60°, however, where Professor Dall found so many eastern species mixed with the western, the division into wet and dry seasons is not marked, which may account for the breeding there of those eastern birds not found south of that latitude on this coast.

In California we find the influence of the rains causing considerable difference in dates of laying in various localities, where they end sooner or later. Thus at Fort Mojave, Colorado Valley, though the winter is colder than at San Diego, it is much drier, the climate, like that of Arizona, being wet in summer. I therefore found the same species laying much earlier at Fort Mojave, though the arrival of migratory birds was generally later, more so than the difference of latitude (one hundred and forty miles farther north) would account for. Many species are also found wintering there which do not remain along the rainy coast at that season.

At Haywood, on the east side of San Francisco Bay, I also found many species laying earlier and more abundantly than at Santa Cruz on the coast, forty-eight miles farther south, but more rainy. This last place is itself much more favorable to most species than the foggy cool promontory of Monterey, twenty-five miles southward.

Of the influence of climate in localities still farther inland I cannot state much from personal observation north of Fort Mojave, but have quoted some interesting dates for comparison, reported by Mr. Ridgway at Sacramento, though of less value in this connection than if he had been there earlier and later in the season.

On account of the great elevation and very different climate of Nevada and Utah, his observations there are of little value for comparison with Western California, though in some degree comparable with Fort Mojave.

The period at which rains cease being quite different in different years, we also find considerable variation in the arrival of some birds as well as in dates of laying at any locality selected. In some years the migrants seem to take a much more inland route northward than in others, not appearing along the coast until long after their comrades have reached even to Alaska. Thus Mr. Dall records the arrival and laying of some species along the Yukon at about the same times they are recorded near the California coast.

The moderately dry parts of California, where, south of latitude 38°, trees are limited chiefly to the northeast slopes of hills and the banks of streams, we find to be the favorite breeding grounds of most

western birds (except of course the water-loving species), nests being both far more numerous and more easily found than in the thickly wooded regions of the mountains and northern coast. I have myself found more in one spring in the vicinity of Haywood, than during three seasons near the Columbia River. A similar abundance of nests has been noted by me along the sparsely wooded shores of the Upper Missouri River, and similar streams crossing the "Great Plains" on both sides of the Rocky Mountains. The scattered tree-growth of those regions, like that of an old cultivated country, is therefore most favorable for the increase of most land-birds, and if moderate protection instead of persecution is granted to them, they may always continue abundant even when the country is cultivated. The little fertile valleys scattered through the desert regions west of the Rocky Mountains are always found to contain most of the birds, and being also attractive to settlers, the abundance of birds has been wrongly attributed to their presence. The only way in which settlements aid in the increase of birds is by driving off or killing the rapacious kinds, and thus protecting such of the small species as do not injure the crops.

There is no doubt of the increase in numbers of many species about the settlements of California, from this cause, since 1849, but others, especially game-birds and birds of prey, have very much diminished under the effect of persecution by the gun, and poisoning, through the use of poisoned grain intended to kill vermin.

The influence of the more local attachments of the west-coast birds, which are so generally constant residents instead of migratory, is also very soon observed in the disappearance of a species from a neighborhood like Haywood, where they have been robbed of their nests and eggs for several seasons. The same thing seems to keep away migratory species to some extent, though other reasons may be found for their absence. As instances, the Blue-birds (*Sialia*) entirely disappeared in 1878, not returning even in winter; though I knew of several of their nests that were not molested in 1877. The migratory Lawrence's Goldfinch and Blue Linnet (*Cyanospiza*) also failed to appear in the breeding season of 1878, perhaps from former persecutions, and perhaps from taking another route northward, or from causes yet unknown.

As a rule scarcely any of the birds of California, south of latitude 38°, raise two broods in a season. When late broods are found they seem either to be replacements of lost broods, or are perhaps hatched by one parent while the other still takes care of a first brood, as observed by me in the case of a pair of House Wrens. This is the effect of the rapidity with which the breeding season passes, corresponding to the rapid but short growing season of vegetation after the frosts cease and before it becomes too dry. Caterpillars and other soft insects suitable for the young become scarce when the vegetation gets dry. Even swallows, which feed in the air, are obliged to catch young grasshoppers in some localities near the coast in June, so that they can raise

two broods of young. Apparently an effort to raise a third or a very late brood causes them often to abandon it to starve when they leave us in August.

In the following table I have included only those land-birds that are best observed in regard to habits, giving the records I have made at the chief localities where I have collected in the proper seasons, and adding such notes as seemed suitable, made by me in other localities, and by others where exact dates of the events are given. The object has been to give exact dates of the usual arrival and departure (with a few also quite exceptional), and the first laying of eggs noticed, as well as the latest when long after. A few quotations of observations in other regions are also given for comparison, but these are much fewer than desirable from the fact that the older authors neglected usually to give the *exact* dates, and where the *month* only is given a comparison of times through a range of twenty degrees of latitude is impracticable. The categories of "Resident," etc., refer only to the localities given in the general table.

The arrangement of localities being by date of collections is not exactly according to their relative positions in latitude.

My opportunities for observing in regard to most aquatic birds have been too few to be worth noting, the sea-shore and the great interior marshes or lakes not having been visited at the proper seasons, except in a few localities. Where it is practicable the dates of laying of the Gulls, Murres, and other birds whose eggs are collected for market, are found quite uniform, though showing the influence of early or late seasons in a certain degree. This makes them well worthy of record whenever opportunities are offered.

Name, season of residence, etc.	Camp Mojave, 1860-61; lat., 35°; alt., 500 ft.	San Diego, 1861- 62; lat., 32° 30'; alt., 50 ft.	Santa Cruz, 1865; lat., 37°; alt., 50 ft.	Saticoy, 1872- 73; lat., 34° 27'; alt., 50 ft.	Haywood, 1875- 76; lat., 37° 40'.	Haywood, 1877- 78; alt., 50-100 ft.	Other localities and remarks.
1. <i>Turdus naug.</i> Winters. (Summers in Alaska to lat. 60°, Dall.)	Leave April 1.	.....	.....	Arrive Nov. 5.	Ar. Oct. 12.	Lv. May 1.	Catalina I. Oct. 30, 1861. "Not at Camp Bowie, Ariz., till Oct. 19, '74." <i>Hensh.</i>
2. <i>Turdus uetulus.</i> Summer.	.....	Ar. April 25.	Nest May 4.	Ar. May 8. Lv. Oct.	Ar. Apr. 20, '75. Ar. Apr. 23, '76. Nest May 14 to June 27, '76. Lv. Sept. 20, '75.	Ar. Apr. 26, '77. Ar. May 6, '78. N. May 24, '77 to June 24, '77. N. May 25, '78. Lv. Sept. 7, '78.	Probably raises only one brood in Cal. Ar. Columbia River, May 1. N. June 15 to July 13. Lv. in Sept. '54.
3. <i>Turdus naugus.</i> Winter. (Summers from mouth Co- lumbia River to lat. 65°.)	.....	.....	Ar. Oct. Lv. Apr. 1.	.....	Ar. Oct. 23, '76.	Ar. Oct. 20, '78.	
4. <i>Harporhynchus rufirostris.</i> Resident.	.....	.....	.....	N. May 28.	.....	.....	N. San José V., May 8, '63.
5. <i>Stelia mexicana.</i> Resident.	N. Feb'y?	.....	.....	.....	N. Mar'h 12, '75. N. Apr. 12, '76.	.....	N. Santa Cruz Mts., 3,000 ft., Apr. 20, '64; Santa Barbara, about Apr. 6.
6. <i>Psaltirparus minimus.</i> Res- ident.	.....	N. Apr. 25.	.....	.....	N. May 15, '75. N. May 23, '76.	N. Apr. 11, '77. N. May 10, '78.	"N. Columbia R., May 15, '35." <i>Nuttall.</i>
7. <i>Thryothorus bewickii</i> , var. <i>spurius.</i> Resident.	.....	N. Apr. 15.	.....	.....	.....	N. May 18, '77. N. May 23, '78.	Have seen fledged young two weeks earlier at Haywood.
8. <i>Troglodytes domesticus</i> , var. <i>parkmanni.</i> Resident south of lat. 37°.	.....	N. Apr. 20.	.....	.....	Ar. Mar. 15, '75. N. May 7, '75. N. Apr. 12, '76.	Ar. Mar. 16, '77. N. Apr. 26, '77.	Ar. Puget's Sound, Apr. 20, '54. Ar. San Francisco, Mar. 15, '65. "N. Vancouver's I., May 18, '52." <i>Hepburn.</i>
9. <i>Dendroica aestiva.</i> Summer.	Ar. Apr. 15.	.....	Ar. Apr. 12.	Ar. Apr. 17. N. May 24.	Ar. Apr. 20, '75. N. May 12, '75. Lv. Oct. 13, '75. Ar. Apr. 22, '76. N. May 14, '76.	N. May 12, '77. N. May 13, '78. to June 15, '78.	Ar. Monterey, Apr. 18, '74. "Ar. Puget's Sound, May 3, '56." <i>Sickel.</i> "Ar. lat 60° Alaska, May 10, '71." <i>Dall.</i>
10. <i>Dendroica auduboni.</i> Win- ter. (Locally, summer.)	.....	Lv. March.	Ar. Sept. 25. Lv. Apr. 15.	Ar. Oct. 11. Lv. Apr. 10.	Ar. Sept. 20, '75.	Lv. Apr. 15, '77.	N. and E. seen taken in S. F. Co. Apr. '77; ♀ killed! Young, Sierra Nevada, July, 7,000 ft.

Name, season of residence, etc.	Camp Mojave, 1860-61; lat., 38°; alt., 500 ft.	San Diego, 1861- 62; lat., 32° 30'; alt., 50 ft.	Santa Cruz, 1865; lat., 37°; alt., 50 ft.	Salicy, 1872- 73; lat., 34° 27'; alt., 50 ft.	Haywood, 1875- 76; lat., 37° 40'.	Haywood, 1877- 78; alt., 50-100 ft.	Other localities and remarks.
11. <i>Dendroica nigrescens</i> . Spring and autumn (only?).	Ar. Apr. 20.....	Ar. Apr. 20.....	Ar. Apr. 27..... Lv. Sept.	Ar. Apr. 17..... Lv. Sept. 30.	Ar. Apr. 10, '75..	Ar. Apr. 26, '77..	Ar. Monterey, Apr. 18, '74. "Pu- get's Sound, May 4, '56," "Suckley." Tejon Pass, Oct., '54." "Heermann." Tejon Mts., Aug., '75." <i>Hensh.</i>
12. <i>Dendroica townsendi</i> . Spring and autumn (breed?).	.....	Ar. Apr. 21.....	.....	.....	Ar. May 6, '75.. Seen Sept. 12. Ar. May 5, '76. Lv. Dec. 5, '76.	Ar. May 6, '78..	"Seen Columbia R., Oct. 28, '35." <i>Townsend.</i> Seen? (Columbia R., Dec. 25, '54. Shot, Mount- ain View, Cal., Nov., '55. <i>D. occidentalis.</i> The obtaining of this species at Pataluma, Cal., given as Apr. 1, '56 (Sam- uels), in P. R. R. Rep., IX, is changed to May 1, in "N. A. Birds," which is more proba- ble. Very rare near the coast.
13. <i>Icteria viridis</i> , var. <i>longi- cauda</i> . Summer.	Ar. Apr. 20..... N. May 19.	Ar. Apr. 26.....	Ar. Apr. 27..... Lv. Sept.	Ar. Apr. 17..... Lv. Sept. 30.	N. May 20, '76..	Ar. Apr. 26, '77..	"N. Sacramento, June 11 to 17, '67." <i>Ridgway.</i>
14. <i>Myiodytes pusillus</i> , var. <i>paleolatus</i> . Summer. (A few winter!).	.....	Ar. ? Apr. 16.....	Ar. ? Apr. 20.....	Ar. Mar. 18.....	Ar. Mar. 31, '75.. N. June 17, '75.	Ar. ? Apr. 4, '77.. N. May 10, '77.	Seen at Puget's Sound, W. T., Apr. 8, '54. "N. Yukon R., May 20, '71." McDougall. Seen Catalina I., Oct. 30, '61.
15. <i>Hirundo erythrogaster</i> , var.? <i>horreorum</i> . Summer.	Ar. Mar. 25.....	Ar. Mar. 18.....	Ar. Mar. 21..... Lv. Sept. 15.	.....	Ar. Mar. 20, '75.. Lv. Sept. 20, '75. Ar. Mar. 23, '76.	.....	"N. Apr. 30 to Aug. 4 at S. F." <i>Hepburn.</i> Raises two broods.
16. <i>Hirundo falca</i> , var. <i>luni- frons</i> . Summer.	.....	Ar. Mar. 15.....	Ar. ? Apr. 10..... N. Apr. 20 to July 5.	.....	Ar. Mar. 24, '75.. Ar. Mar. 27, '76.	Ar. Mar. 23, '78..	In 1877 very dry, and few seen the whole season. A few stay till October. Raise two broods, but leave many young to die.
17. <i>Hirundo bicolor</i> , var. <i>ves- pertina</i> . A few residents S. of lat. 39°.	Ar. Feb. 21.....	.....	Lv. Sept. 2.....	N. May 14.....	Ar. Jan. 28, '75..	Ar. Jan. 30, '77..	"Shot S. F. winter '54." <i>Cutts.</i> "N. Sacramento, May, '53." <i>Hepburn.</i> Two broods!
18. <i>Hirundo thalassina</i> . Sum- mer.	.....	.....	Ar. Mar. 19..... Lv. Oct. 5.	.....	.....	.....	Ar. San José V'y., Mar. 15, '64. "Puget's Sound, May 10, '56." <i>Suckley.</i>

19. <i>Progne subis</i> . Summer	Ar. ? Apr. 26.	Ar. Mar. 17. (Stragglers?)			"Ohio R., Mar. 15." Aud. S. F., Apr. 29, '63. N. Monterey, Apr. 25, '74.
20. <i>Lanius ludovicianus</i> , var. <i>excubitorides</i> . Resident.	N. Mar. 19 to Apr. 4.			N. Mar. 30, '75. N. to June 2, '76.	Perhaps raises two broods in some years.
21. <i>Capodacus frontalis</i> , var. <i>rhodocopus</i> . Resident.	N. May 8.	N. Mar. 19.	N. Apr. 10.	N. Apr. 2, '75. N. June 2 to 21, '76.	Raises two broods, perhaps 3 at times.
22. <i>Chrysomitris tristis</i> . Some resident.	N. May to June.	N. Apr. 18.		N. June 24 to June 28, '76.	"N. Sacramento, June 6 to 29, '67." Ridgway. "N. New England, July 10 to Sept." Brewer.
23. <i>Chrysomitris psaltria</i> . Resi- dent.				N. Apr. 16, '75. N. Apr. 20 to June 29, '76.	This and last species may raise two broods.
24. <i>Chrysomitris laurencii</i> . Some resident S. of lat. 38°.				Ar. Mar. 27, '76. N. May 7, '75.	None seen after April in 1878.
25. <i>Passerculus sandwichensis</i> , var. <i>alaudinus</i> . Winter (some resident). Var. <i>anthus</i> . Resident S. of lat. 37°.	Ar. Oct. 25. Lv. Apr.			Ar. Nov. 1.	Near Columbia R., Mar. to Oct., '54 (<i>alaudinus</i>). Sept. to Apr. (<i>sandwich</i>). A few of <i>alaudinus</i> probably breed near the coast, lat. 35° (and on mountains?).
26. <i>Chondestes grammacus</i> . Resi- dent S. of lat. 38°.					"N. Sacramento, Cal., June 8 to 29, '67." Ridgway.
27. <i>Zonotrichia leucophrys</i> , var. <i>gambeli</i> . Resident N. of lat. 37°. Winters only south- ward.	Lv. May 15.	Ar. Oct. 15.	N. May 7.	Ar. Sept. 20. Lv. Apr. 15.	Winter birds are chiefly var. <i>intermedia</i> . Seen on Catalina I., Oct. 30, '61. Ar. Columbia R., Mar. N. June. Lv. Oct., '64.
28. <i>Zonotrichia coronata</i> . Win- ters (only?).					"Breeds McCloud R., Cal." Brewer, 1878. Seen at Mon- terey, Apr. 20, '74. The nest eggs described in Heer- mann's report as from Sacra- mento were probably those of <i>Chondestes</i> , description trans- posed from his next paragraph.

Name, season of residence, etc.	Camp Mojave, 1860-61; lat., 35°; alt., 500 ft.	San Diego, 1861-'62; lat., 32° 30'; alt., 50 ft.	Santa Cruz, 1865; lat., 37°; alt., 50 ft.	Saticoy, 1872-'73; lat., 34° 27'; alt., 50 ft.	Haywood, 1875-'76; lat., 37° 40'.	Haywood, 1877-'78; alt., 50-100 ft.	Other localities and remarks.
29. <i>Junco oregonus</i> . Resident in mountains and at Monterey. "Tejon Mts., Aug., 1875." <i>Henshaw</i>.	.....	Lv. Apr. 1.....	.....	Lv. Apr. 10.....	Ar. Oct. 9, '75.....	.....	N. foot Santa Cruz Mts., May 1; 3,000 ft. alt., May 30, '64 N. Sierra Nev., 6,000 ft. alt., July 28, '70.
30. <i>Spizella socialis</i> , var. <i>arizonensis</i> . Summer. Winter in Colorado Valley, lat. 35°, and southward.	.....	Ar. ? Apr. 23.....	Ar. Apr. 11..... N. May 3.	Lv. Nov. 5.....	Ar. Apr. 2, '75..... N. May 20, '75. Ar. Apr. 9, '76. N. May 22, '76.	Ar. Mar. 29, '77. N. Apr. 27, '77.	Ar. S. F., Apr. 4, '63. "Ar. Puget's Sound, April, '56." <i>Suckley</i> .
31. <i>Melospiza fasciata</i> , var. <i>heermanni</i> . Resident.	Var. fallax. N. May 19.	.....	N. Apr. 15 to July 10.	N. May 15.....	N. May 7, '75. N. May 16, '76. to June 22, '76.	N. May 12, '77. N. May 13, '78.	Supposed young seen at Santa Cruz, Apr. 7, '65. Those of var. <i>guttata</i> in May at Puget's Sound, '54.
32. <i>Melospiza lincolni</i> . Migratory (summer on mountains).	.....	Lv. Mar. 26.....	.....	Ar. Nov. 15. Lv. Mar. 25.	.....	Lv. Mar. 15, '77.	All probably winter S. of lat. 35°. "Nests, Alaska, May to July." <i>Deall</i> . N. 7,000 ft. alt. in lat. 39°, July 27, '70.
33. <i>Passerella townsendi</i> . Winter.	.....	.....	.....	Ar. Nov. 11. Lv. Apr. 15.	Ar. Nov. 15, '75.	Ar. Nov. 9, '79.	Ar. S. F., Oct. 20, '63.
34. <i>Gairacra melanocephala</i> . Summer.	.....	Ar. Apr. 12.....	Ar. Apr. 12.....	.....	N. May 14, '75. N. May 18, '76.	Ar. Apr. 10, '77. N. May 3, '77. N. May 13 to June 16, '78.	N. San José Vv., May 12, '74. Probably only raise one brood.
35. <i>Gairacra coerulesa</i> . Summer.	Ar. May 6.....	.....	Ar. Apr. 12.....	Ar. Apr. 17.....	Ar. ? May 1, '76.	.....	N. Sacramento, June 14, '65. Do. "June 11 to 29, '67." <i>Ridgway</i> .
36. <i>Oyanospiza amena</i> . Summer.	.....	Ar. Apr. 22.....	Ar. Apr. 12..... N. May 2. Lv. Oct.	Ar. Apr. 17.....	Ar. Apr. 20, '75. N. May 15, '75. Ar. May 1, '76. N. May 24, '76. to June 18, '76.	Ar. Apr. 26, '77.	N. Santa Barbara, May 6, '63. Ar. Puget's Sound, May 15, '55. None seen in '78. Probably only one brood.
37. <i>Pipilo maculatus</i> , var. <i>melanogala</i> mixed with var. <i>Oregonus</i> . Resident.	.....	.....	.....	.....	N. June 3, '76.	N. Apr. 29, '77. N. June 18, '77. (3 feet up in brush?)	N. Santa Cruz Mts., 3,000 ft. alt., May 28, '64. N. S. F., June 10, '64. Probably but one brood.

38. <i>Pipilo fuscus</i> , var. <i>crissalis</i> . Resident.	N. Apr. 10.....	N. Mar. 17 to May 8.....	.....	N. Apr. 3, '75. N. Apr. 5 to June 24, '76.	N. Apr. 14, '77 to June 24, '77.	May raise two broods.
39. <i>Agelaius phoeniceus</i> , var. <i>gubernator</i> . Resident.	.....	.....	.....	N. Apr. 18, '75.	N. May 4, '77.	N. Santa Barbara, Apr. 25, '63. To 3,000 ft. on Santa Cruz Mts.
40. <i>Agelaius tricolor</i> . Resident.	.....	.....	.....	N. May 22.....	.....	"N. near Saticoy to June 21, '75." <i>Ilensham</i> .
41. <i>Sturnella magna</i> , var. <i>neg- lecta</i> . Resident.	.....	.....	.....	N. May 7, '76.	N. May 8, '77. N. May 10, '78.	"N. Wash. Ter. June 19, '56." <i>Sackley</i> . N. San José VY, May 18, '64.
42. <i>Icterus bullockii</i> . Summer.	Ar. Apr. 1..... N. Apr. 17.	Ar. Apr. 3.....	Ar. Mar. 22..... Lv. Sept. 15. (1 seen Nov. 25.)	Ar. Mar. 31, '75. N. May 20, '75. Ar. Apr. 3, '76.	Ar. Mar. 19, '77. N. May 18, '77. Ar. Mar. 31, '78. N. May 28 to June 20, '78.	"Ar. Puget's Sound, May 15, '54. Ar. Dallas, Oregon, May 7, '55." <i>Sackley</i> .
43. <i>Scolopagus cyanocephala</i> . <i>us</i> . Resident.	.....	N. Apr. 16 to May 20.	.....	N. Apr. 23, '76 to June 18, '76.	N. Apr. 14, '77.	N. Santa Barbara, May 1, '63. Some of the two broods? Scarce in '78.
44. <i>Corvus americanus</i> , var. <i>caurinus</i> . Resident.	.....	N. Apr. 23.....	.....	.....	.....	Very locally distributed.
45. <i>Cyanocitta californica</i> . Res- ident.	.....	N. Apr. 8.....	.....	N. May 20 to June 21, '76.	N. June 10, '78.	"In '34 bred at Columbia R." <i>Nuttall</i> . Not recently ob- served there.
46. <i>Tyrannus verticalis</i> . Sum- mer.	Ar. Apr. 24..... Lv. Oct.	Ar. Apr. 3.....	Ar. Mar. 27..... N. Apr. 20 to June 29. Lv. Oct. 1.	Ar. Apr. 12, '75. N. May 22, '75. Ar. Mar. 26, '76. N. May 13, '76.	N. May 15 to June 23, '77.	N. Santa Barbara, May 12, '64. "N. Sacramento, June 11 to 20, '67." <i>Ridgway</i> .
47. <i>Tyrannus vociferans</i> . Some winter S. of lat. 37°.	.....	N. Mar. 29.....	.....	.....	.....	.....
48. <i>Myiarchus cinerascens</i> , var. <i>cinerascens</i> . Summer (chief- ly).	(A few winter) Ar. Mar. 10.	Ar. Apr. 17.....	.....	.....	N. May 11, '77. N. June 3 to June 20, '78.	One nest found in hole in side of house.
49. <i>Sayornis nigricans</i> . Resi- dent.	Lv. Mar. 25..... (None in sum- mer?)	N. Mar. 27.....	N. Mar. 29.....	N. Apr. 15, '76.	N. Apr. 14, '77, to June 17, '78.	Raises two broods.
50. <i>Contopus richardsonii</i> . Summer.	Ar. ? May 20.....	Ar. Apr. 16.....	Lv. Sept. 28.....	Ar. ? May 20, '77.	.....	Ar. Monterey, May 11, '74. "Petahma, Cal., Apr. 5, '56." <i>Snowden</i> . "N. Sacramento, June 10 to 24, '67." <i>Ridgway</i> .

Name, season of residence, etc.	Camp Mojave, 1860-61; lat., 35°; alt., 500 ft.	San Diego, 1861- 62; lat., 32° 30'; alt., 50 ft.	Santa Cruz, 1865; lat., 37°; alt., 50 ft.	Saticoy, 1872- 73; lat., 34° 27'; alt., 50 ft.	Haywood, 1875- 76; lat., 37° 40'.	Haywood, 1877- 78; alt., 50-100 ft.	Other localities and remarks.
51. <i>Empidonax flaviventris</i> , var. <i>difficilis</i> . Summer.	Ar. ? Apr. 15. Lv. Oct.	Ar. Mar. 13.	Ar. Mar. 18.	Ar. Mar. 31, '75. N. Apr. 27, '75. Ar. Apr. 2, '76. N. May 13 to 26, '76.	Ar. Mar. 16, '77. N. Apr. 21, '77. N. May 6, '78. Lv. Nov. 1, '78.	Ar. Puget's Sound, Apr. 25. Lv. Sept. 1, '55.
52. <i>Chactura voczii</i> . Summer.	Ar. Apr. 26, '72.	Ar. May 4. Lv. Oct. 5.	Ar. Apr. 21. .....	.....	.....	Not yet known to build in chim- neys, or in towers.
53. <i>Salasphorus rufus</i> . Sum- mer. (Part of the California birds may be var. <i>f. Henshawii</i> , Elliot.)	Ar. Feb. 5.	Ar. Mar. 9, '65.	Ar. ? Mar. 18. N. Apr. 9 to May 20.	Ar. Feb. 16, '75. Ar. Feb. 18, '76. N. May 24, '76.	Ar. Feb. 16, '77. N. Apr. 17 to June 9, '77.	Ar. Columbia R., Mar. 10, '54. " N. Columbia R., May 10, '56." <i>Stockley</i> .
54. <i>Calypte annæ</i> . Resident southward.	N. Feb. 20, '75. N. Feb. 16 to June 24, '76.	N. Feb. 9 to May 30, '77.	May raise two broods.
55. <i>Picus villosus</i> , var. <i>harrisi</i> , Resident.	N. May 18, '77.	N. Santa Barbara, May 8, '64. " Var. <i>villosus</i> has two broods in the south." <i>Atad</i> .
56. <i>Picus nuttalli</i> . Resident.	N. Apr. 20. .....	.....	.....	.....	.....	N. Monterey, May 12, '74. " Young, Santa Barbara, May 1, '43." <i>Gambel</i> .
57. <i>Colaptes mexicanus</i> . Resi- dent.	N. Apr. 15. .....	.....	.....	N. May 7, '75. N. May 10, '76, to May 27, '76.	N. Apr. 23, '77.	N. Santa Barbara, May 1, '63.
58. <i>Strix flammea</i> , var. <i>ameri- cana</i> . Resident.	N. Apr. 4, '75. N. Apr. 14 to May 12, '76.	N. Apr. 13, '77.	" N. Florida at all seasons; in South Carolina, Sept. 15, '32." <i>Aud. ?</i>
59. <i>Bubo virginianus</i> . Resi- dent.	N. Mar. 18. .....	.....	.....	.....	N. Apr. 24, '77.	" N. Yukon R., Alaska, Apr. 10." <i>Kennicott</i> . " N. Mass., Feb." <i>Jillson</i> . " N. Penn., Feb." <i>Jackson</i> .
60. <i>Scops asio</i> , var. <i>maculati</i> . Resident.	N. May 17, '76.	N. Apr. 14, '77. N. May 2, '78.	N. Santa Barbara, Apr., '64.
61. <i>Otus brachyotus</i> , var. <i>wil- sonianus</i> . Resident.	N. Mar. 25. .....	.....	.....	.....	.....	" N. in British America, Apr. to July, two broods." <i>Rob- ardson</i> .

62. <i>Falco sparverius</i> . Resident.	.....	.....	.....	N. Apr. 10, '75. N. Apr. 10, '76.	N. Apr. 21, '77..	
63. <i>Buteo borealis</i> , var. <i>calurus</i> . Resident.	.....	N. Mar. 28.....	.....	.....	N. Apr. 15, '77.. N. Apr. 26, '78..	"N. Apr. 25, '66, at Petaluma." <i>Samuels</i> .
64. <i>Circus cyaneus</i> , var. <i>hudsonius</i> . Resident.	.....	N. Apr. 10.....	N. May 28.....	.....	.....
65. <i>Columba fasciata</i> . Resident.	.....	.....	N. May 20, 1864, in mts., 3,000 ft. alt.	.....	N. May 15, '78..	Ar. Columbia R., Apr. N. Co- lumbia R., June. Lv. Colum- bia R., Oct.
66. <i>Zenaidura carolinensis</i> . Resident S. of Mt. 380.	N. Apr. 25.....	.....	N. May 25.....	.....	N. May 12, '77.. N. May 20, '78.. to June 18, '78.	
67. <i>Lophortyx californicus</i> . Resident.	.....	N. Apr. 22.....	.....	N. Apr. 10, '75..	N. Apr. 29, '77..	Second laying (?) near Oakland, July 18, '74.

68. *Ardea herodias*. Resident. Nests near San Diego, Apr. 24.

69. *Agelaius carolinensis*, var. *nivosa*. Resident. N. San Pedro, May 22, '62. "N. Santa Barbara to July, '75." *Henshaw*.

70. *Anas boschas*. A few breed near coast. Female shot near San Diego, Apr. 24, '62, with nearly matured eggs. Eggs at Columbia R. and Puget's Sound, in June, '53 and '55.

71. *Querquedula cyanoptera*. Resident. A female shot June 22, '61, near San Luis Rey, lat. 34° 20', with mature egg in it.

72. *Larus occidentalis*. Resident. "First eggs, Farallone I., May 6, '63, May 13, '64." Continue to lay until July at least.

73. *Uria lomvia*, var. *californica*. Resident. "First eggs, Farallone I., May 29, '63, May 17, '64; continuing till Aug." These dates I got from the light-house keeper, who also said that the Murres were absent from the islands between Nov. and Feb., but I saw none of them as far south as Santa Barbara. Exact dates for the eggs of other birds found laying on these and more southern islands in May and June have not yet been obtained.

DESCRIPTIONS OF NEW SPECIES OF CARBONIFEROUS INVERTEBRATE FOSSILS.

By C. A. WHITE.

The fossils herein described are among the collections of the National Museum. The coral was obtained by Prof. O. St. John in the Black-foot Range of mountains, southward from the Yellowstone National Park, in the summer of 1877, while prosecuting his work as geologist of one of the parties of the survey then in charge of Dr. F. V. Hayden. The spines of *Archæocidaris* are a part of a small collection of Upper Coal Measure fossils sent by Mr. Frank M. Dininny from Tecumseh, Nebraska. The four species of crinoids, here described as new, constitute part of a collection which has been for several years in the cases of the Museum, the donor of which collection is unfortunately unknown. The only label accompanying the fossils contained only the following inscription: "From thirty miles west of Humboldt, Kansas." The place thus indicated, as determined by a Land-Office map, is in the valley of one of the upper branches of Verdigris River, a tributary of Arkansas River. Besides the four new species just mentioned, those enumerated with them in the following list constitute this interesting collection:

1. *Platyceras nebrascensis*, Meek.
 2. *Pinna peracuta*, Shumard?
 3. *Terebratula millipunctata*, Hall.
 4. *Spirifer cameratus*, Morton.
 5. *Spirifer* (*Martinia*) *lineatus*, Martin.
 6. *Spirifer* (*Martinia*) *planoconvexus*, Shumard.
 7. *Spiriferina kentuckensis*, Shumard.
 8. *Spirigera subtilita*, Hall.
 9. *Retzia mormonii*, Marcou.
 10. *Hemipronites crassus*, Meek and Hayden.
 11. *Meekella striatocostata*, Cox.
 12. *Productus semireticulatus*, Martin.
 13. *Productus punctatus*, Martin.
 14. *Productus longispinus*, Sowerby.
 15. *Productus nebrascensis*, Owen.
 16. *Cyathaxonia distorta*, Worthen.
 17. *Fistulipora nodulifera*, Meek.
 18. *Rhombipora lepidodendroides*, Meek.
 19. *Glaucanome* ———?
 20. *Lecythiocrinus olliculæformis*, sp. nov.
 21. *Cyathocrinus stillativus*, sp. nov.
 22. *Eriocrinus typus*, Meek and Worthen.
 23. *Eriocrinus planus*, sp. nov.
 24. *Rhodocrinus vespertalis*, sp. nov.
- Besides these there were fragments of three other species of crinoids

belonging to the *Cyathocrinida*. Although all, or nearly all, the crinoids hitherto published from the Upper Coal Measures of the United States, belong to the *Cyathocrinida*, the species No. 21 of the foregoing list is the first one known from that formation which presents exactly the calycular formula of true *Cyathocrinus*. Besides this two of the other new species of crinoids belong to genera that have hitherto been unknown in North American strata above the Subcarboniferous, one of them, indeed, being never before known to exist. Such facts demanded rigid inquiry as to whether these strange forms might not have been derived from some older formation, and become accidentally mixed with those from the Upper Coal Measures, especially as the package was not, when first examined by me, securely closed, and the record was defective as before indicated. All the specimens were therefore subjected to careful examination under the lens, which disclosed the fact that some one or more of these new forms had adhering to its surface a greater or less number of minute fragments of Polyzoans, which were not only recognized as Upper Coal Measure species, but fragments of the same were found adhering to many of the well-known Upper Coal Measure brachiopods associated with them in the collection. In addition to this, the character and aspect of the imbedding matrix, so far as it remained with the fossils, were found to be essentially the same upon both the new and well-known forms. There appears, therefore, to be no room for reasonable doubt that these new forms, as well as the others which are associated with them in the collection, came from Upper Coal Measure strata at the locality indicated by the label as before mentioned; and that they are all from substantially the same local horizon. The loss of the record of the donor's name is to be regretted, but it was no doubt occasioned by the confusion into which a part of the collections of the Museum fell at the time of the fire which a few years ago damaged the building of the Smithsonian Institution.

The discovery of these new crinoidal forms is not only interesting in itself, but it is important as showing a persistence of certain paleozoic crinoidal types up to almost the closing epoch of Paleozoic time as it is represented by North American strata. The intimate relationship of at least the brachiopodal fauna of the Subcarboniferous series of the Mississippi Valley (especially that of the Chester limestone member of that series) with that of the Upper Coal Measure limestone and shales is well known. Indeed, quite a number of the brachiopods of these two formations we must consider as specifically identical. The case is different, however, with the crinoidal faunæ of the two formations as regards specific identity, for they afford no exception to the rule that fossil crinoids have a narrowly limited vertical range. But in the case of these fossils there is shown by this collection to be a recurrence of formerly existing types, or, more properly speaking, these newly discovered types indicate the continuation through preceding epochs of

certain generic and family types, that have heretofore been discovered only in the strata representing the earlier of those epochs. Thus *Rhodocrinus vesperalis* and *Cyathocrinus stillaticus* have their nearest known representatives in the Burlington limestone of the Subcarboniferous series. This is interesting because the crinoidal fauna of the Upper Coal Measures had hitherto presented a good degree of contrast with corresponding faunæ of the different divisions of the Subcarboniferous group as well as with that of the group as a whole. For example, as has been already mentioned, there is a great preponderance of the *Cyathocrinidæ* in the Upper Coal Measure strata. These are mostly of peculiar types, and their bodies are mostly also composed of massive pieces. *Erisocrinus* is peculiar to this latest of the Carboniferous epochs, as represented by the strata of the great Mississippi Valley, and it is interesting to note that the new genus *Lecythiocrinus* agrees with it in excluding the whole of the anal series of its pieces from participating in the structure of the calyx.

The other species of crinoids which are named in the list as associated with these new forms belong to types, either generic or intergeneric, which have been hitherto found only in Upper Coal Measure strata.

The spines of the species here described as *Archæocidaris dininnii* give a very inadequate idea of the characteristics of the whole animal, and such a description has very little value in zoölogical classification; but for the convenience of geological study it is thought best to give systematic names even to such zoölogically imperfect objects as these, that they may be used in the classification of all the recognizable fossils which characterize different formations respectively. The species represented by these spines has quite a wide geological range in the Upper Coal Measures of the valleys of the Lower Missouri and Upper Mississippi Rivers, and their characteristics are such that the species may be readily recognized.

The full Carboniferous series of the great Rocky Mountain region is several thousand feet in thickness; and the horizon within this limit, from which the coral herein described as *Acervularia adjunctiva* comes, is not accurately known. This discrepancy, however, is apparently of less importance than it otherwise would be, from the fact that not only is the great Carboniferous series of that region not marked off into epochal groups in the same manner that it is in the Mississippi Valley, but it is there everywhere difficult to find any recognizable planes, either paleontological or stratigraphical, for the separation of the series into any well-defined groups.

ACTINOZOA.

Genus ACERVULARIA, Schweigger.

Acervularia adjunctiva (sp. nov.). Plate 1, figs. 1, 2, and 3.

Corallum massive or subdiscoidal, composed of compactly united corallites of somewhat unequal size; corallites approximately straight, irregularly polygonal, averaging about five millimeters in diameter, their outer surfaces faintly marked by vertical lines which indicate the places of the septa within, but they are not sufficiently distinct to give a crenulated border to the calyx; these surfaces also present more or less distinct irregular transverse wrinkles or undulations; outer wall of the corallites distinct but not thick; inner wall well developed; diameter of the space inclosed by the inner wall equal to about one-half the full diameter of the corallite; the transverse tabulæ of this central space well developed, distinctly separate from each other, their number being about ten to each centimeter of length of the corallite. The space between the outer and inner walls is occupied by numerous more or less complete shallow infundibuliform plates, which are not quite so numerous as the central tabulæ. These plates spring from the inner wall, which they successively help to form, and arch upward and outward to the outer wall; being the successively abandoned floors of the outer portion of the calyces. They appear to have been not always complete, either as regards their extension to the outer wall or their construction of a symmetrical cup, but they are apparently no more imperfect in these respects than the calyces of such corals often are.

The condition of the only specimens discovered is not such as to show any of the calyces in their natural condition, and the structure of the corallites has therefore been determined by the examination of polished sections, both longitudinal and transverse. While the parts already described are thus distinctly shown, the rays are discovered with difficulty, and they were evidently only slightly developed; their number, as near as it can be ascertained, is about 16 or 17.

The genus *Acervularia* has been regarded as peculiarly a Devonian form, but as related corals are common to both Devonian and Carboniferous strata, there appears no good reason why *Acervularia* may not exist in the latter. This form seems to differ from the typical species of that genus, at least to such an extent as might be naturally expected of it, when found in strata of so much later date than those which contain the typical forms. This is an interesting form, not only as regards its structure, but also in consequence of the marked difference which it presents from any Actinozoan yet described from American Carboniferous strata.

Position and locality.—Carboniferous strata, Blackfoot Range, south of the Yellowstone National Park, where it was discovered by Prof. O. St. John.

ECHINODERMATA.

Genus *LECYTHIOCRINUS* (gen. nov.).

Etym. Ληκίθιον, a small oil flask.

Generic formula.—Basal pieces, 3; subradial pieces, 5; first radial pieces, 5; anal and interradial pieces, 0.

Generic diagnosis.—The basal, subradial, and first radial pieces are all well developed, none of them being minute. The dome is not known, but it was very small in comparison with the size of the body. The facet for the attachment of the column is small and round, but the column is not known. The facets for the attachment of the arms are small; the arms are not known, but they were five in number, and evidently small and delicate. The character, shapes, and arrangement of the three basal pieces are precisely as in *Platycrinus*, and the arrangement of the five subradial pieces upon them is the same as that of the first radials upon the basals in *Platycrinus*. The arrangement of the first radial pieces upon the subradials is essentially the same as that of *Erisoerinus*; that is, they alternate regularly with each other and have no anal or interradial pieces intervening. The body, which is the only portion of the animal yet known, is therefore composed of thirteen pieces, the arrangement of which is essentially that of five first radials, all in close contact with each other, superimposed upon the calyx-structure of *Platycrinus*. Or, if it be assumed that the basal cycle of pieces in the body of every true erinoid contains the elements of five pieces, and that in case there are only three apparent in the adult state, as in *Actinoerinus* and many species of *Platycrinus*, there has been an early ancylosis of two adjacent pieces in two cases, we may regard *Lecythioerinus* as a *Cyathocrinid* thus modified. I am disposed to adopt this view, and I therefore refer the new genus to the *Cyathocrinidæ*. It is thought to be not improbable that if other species of this genus should be discovered the base may be found to be composed of five separate pieces instead of three, but no trace of a fourth and fifth suture can be discovered in the base of the form here described. In case other examples should prove to possess a base composed of five pieces, the other characteristics which it possesses are still sufficient to hold it as a new generic form among the Crinoidea.

Only one example of this interesting erinoid, consisting of the body alone, has been discovered. It is small and delicate in structure, the delicacy of the pieces composing it being similar to that of certain species of *Platycrinus* and *Dichocrinus* found in the Burlington limestone. In this respect it differs from all the hitherto known erinoids of the Upper Coal Measures, the pieces composing the bodies of which are

thick and often massive. This delicacy of structure is probably a generic characteristic.

Lecythiocrinus olliculæformis (sp. nov.). Plate 1, figs. 4 and 5.

Body small, subovoid or pot-shaped, higher than broad, broadest a little below the middle, composed of thin pieces; base convex; basal pieces rather small but not minute; subradial pieces larger than any of the others, higher than wide, their height equal to a little more than half the full height of the body, not materially varying in size or shape; first radial pieces smaller than the subradials but larger than the basals, broader below than above, height and greatest breadth about equal; at top, on both sides of the small prominent arm-facet, the border of each first radial is bent inward, constricting the already narrow interbrachial space at the top of the body, which space was probably covered by a dome of minute pieces. Sutures not impressed or otherwise specially marked. Surface, to ordinary vision, apparently smooth, but a good lens shows it to be very finely granular.

Height, 9 millimeters; breadth, $7\frac{1}{2}$ millimeters.

Position and locality.—Upper Coal Measure strata, thirty miles west of Humboldt, Kansas. See introductory remarks.

Genus ERISOCRINUS, Meek and Worthen.

Erisocrinus planus (sp. nov.). Plate 1, figs. 6 and 7.

Body rather small, subcircular or obscurely pentahedral as viewed from above or below, shallow convex-basin-shaped from the top of the first radials downward; base somewhat deeply impressed at the center, the depression gradually rounding outward to the sides; basal pieces very small, occupying the bottom of the depression of the base and almost covered by the first joint of the column; subradial pieces moderately large, their inner ends bent inwardly by the depression of the base to meet the small basal pieces there, their outer ends extending outward and upward so as to be more or less plainly visible by side view of the body; first radial pieces comparatively large, convex vertically, their upper edges rounded inward to the suture between them and the second radials, their lower angles extending downward almost to the lowest portion of the body visible by side view. The other characters are those common to the genus. One minute piece remains attached to the upper border of the calyx of one of the specimens, at the junction of two of the first radial pieces. This is no doubt an anal piece, its outer surface being in the plane of the outer surface of the calyx, but it does not in any degree enter between the two first radials upon which it rests.

Transverse diameter of the calyx, 14 millimeters; height of the same, 5 millimeters.

This species differs from *E. typus* in having a shallower and more rounded basin-shaped calyx, proportionally smaller basal, and larger subradial pieces, and a more deeply impressed base. It very closely resembles the *Poterioerinus hemisphericus* of Shumard, examples of which are associated with it in the collection. Indeed, so far as the characteristics of the calyx alone are concerned, there appears to be no essential difference except in the relative position of the small anal piece. In *Erisoerinus* no anal piece is recognized as entering into the structure of the calyx, at least none that is visible upon the outer surface, as a greater or less number of such pieces do in *Cyathoerinus* and *Poterioerinus*, but I am not without suspicion that this form which I have, according to the recognized usage in the limitation of genera, here described as new, really belongs to the same species with *P. hemisphericus*, Shumard, and that the displacement of the small anal piece from the rim of the calyx is an individual variation only. If this should prove to be the case it is clear that a revision of the generic formula of *Erisoerinus* will be necessary; and it will doubtless also be necessary to assign the type of this proposed species to *P. hemisphericus*, Shumard. It is clear that the last-named species does not strictly belong to either *Poterioerinus* or *Cyathoerinus*, but it is not my purpose to discuss the generic relations of these forms at this time. Figure 8, plate 1, represents an example of the *P. hemisphericus* of Shumard, which is introduced for comparison with those of *E. planus*.

Position and locality.—Upper Coal Measures, thirty miles west of Humboldt, Kansas. See introductory remarks.

Genus CYATHOCRINUS, Miller.

Cyathocrinus stillativus (sp. nov.). Plate 1, figs. 9 and 10.

Body below the upper border of the first radial pieces shallow basin-shaped, much wider than high, having a narrow, moderately deep, abrupt, five-sided depression at the center of the base, at the bottom of which is the facet for the attachment of the column; composed of eighteen moderately thick and strong pieces, all of which, except the basals, are more or less tumid in their middle portion, some of them presenting an irregular, uneven surface, which, with the impressed sutures and the still more deeply impressed corners of the pieces, gives the surface of the body a decidedly rugose aspect; basal pieces very small, occupying the bottom of the depression at the base, the greater part of each being covered by the first joint of the column: subradial pieces having their height and width about equal, four of them pentagonal, and one, that which is next below the first anal piece, hexagonal, there being no appreciable angle upon that side of any of them which adjoins the basal pieces; first radial pieces much larger than the subradial, wider than their full height including the arm facet; the two

which are adjacent to the anal series being very little if any narrower than the others; arm facets large, about one-third wider than high, their plane being nearly vertical, notched at the upper border and marked transversely by the double ridge or raised lines which are common to the arm facets of many of the *Cyathocrinidæ*; anal pieces three known, nearly equal in size, or the first a little larger than the two second, each with a prominent tubercle at the center; first anal piece five-sided, abutting against one subradial, two first radials and two second anal pieces; the two second anal pieces abut against the first anal, against each other, and each abuts against a first radial.

Diameter of calyx, 14 millimeters; height of the same, 6 millimeters.

This is the first and only species of true *Cyathocrinus* that has to my knowledge yet been discovered in Upper Coal Measure strata; *C. inflexus*, Geinitz, and *C. hemisphericus*, Shumard, sp., not being regarded as typical species of that genus. It belongs to a type that is more characteristic of the Burlington limestone division of the Subcarboniferous than of any other division of the great Carboniferous series, and together with the next described form it shows the crinoidal fauna of the Upper Coal Measures to be more intimately related to that of the Subcarboniferous than it has before been known to be.

Position and locality.—Upper Coal Measure strata, thirty miles west of Humboldt, Kansas. See introductory remarks.

Genus RHODOCRINUS, Miller.

Rhodocrinus vespertalis (sp. nov.). Plate 1, figs. 11 and 12.

Body subglobose, the sides and outer portion of the base continuously convex; the base having a deep, sharply defined, five-sided pit which contains the whole of the five basal pieces, and also the sharply inflexed inner ends of the five subradial pieces; the latter pieces moderately large, but not much larger than some of the radials and interradials; first radial pieces varying a little in size in the different rays, the larger ones nearly or quite as large as the subradial; second radials much smaller than the first, and the third radials still much smaller than the second, the difference in size being greater in their vertical than in their transverse diameter. The third radial in each ray, which is very narrow vertically, supports two brachial pieces, and they in turn each support another brachial piece, beyond which the structure is unknown; interradial pieces up to a line with the center of the arm bases, three for four of the interradial spaces, and four for that of the anal side; the first or lower interradials are of about equal size in each of the spaces, and a little larger than the two next above; dome moderately convex, prominent opposite the arms and somewhat depressed between them, composed of numerous small pieces; proboscis subcentral, its length unknown. All the pieces of the body, except those of the

base, are slightly tumid, their surfaces being rugose or wrinkled, and in some if not all cases marked by obscure lines which radiate from the center of each piece in groups of threes, and become continuous with similar lines on adjoining pieces.

Height from the base of the body to the base of the proboscis, 12 millimeters; breadth of the same, 16 millimeters.

Although this species serves as a very suggestive link between the crinoidal fauna of the Upper Coal Measures and that of the Subcarboniferous, especially that of the Burlington limestone division of that series, it differs too much specifically from any described form embraced by that genus to need detailed comparisons.

Position and locality.—Upper Coal Measure, thirty miles west of Humboldt, Kansas. See introductory remarks.

Genus ARCHÆOCIDARIS, McCoy.

Archæocidaris dininnii. Plate 1, figs. 13, 14, and 15.

Principal spines fusiform, moderately strong, 50 or 60 millimeters long, the greatest diameter being about the middle, which is there about 5 millimeters. The diameter of the basal ring of such a specimen is about $3\frac{1}{2}$ millimeters, and the short neck or plain space above it is scarcely $2\frac{1}{2}$ millimeters in thickness. Above the short plain neck the whole spine is studded with irregularly disposed spinules, 1 to 2 millimeters in length, which stand out at nearly right angles with the axis of the spine, except near its point, where they are directed upward. The spinules are usually more numerous and stronger upon the lower portion of the spine than elsewhere, and upon the middle portion of the large spines they are sometimes obsolete, apparently from some other cause than accidental removal. The smaller spines are often not so thickly studded with spinules as the larger ones, and they are usually more slender or less fusiform than the larger; and some of them seem to have been without a basal ring.

A marked peculiarity of this species is the abundance of spinules upon the spine, especially its lower portion, and the general position of most of them at nearly right angles to its axis.

Position and locality.—Upper Coal Measures, near Tecumseh, Nebraska, whence it was sent with other Upper Coal Measure fossils by Mr. Frank M. Dininny, in whose honor the specific name is given. This species has also been recognized by me in rocks of that formation in other portions of Nebraska and also in Western Iowa.

WASHINGTON, November 8, 1879.

EXPLANATION OF PLATE 1.

ACERVULARIA ADJUNCTIVA.

Fig. 1, a small cluster of corallites, natural size. Fig. 2, transverse section of the same. Fig. 3, vertical section of a single corallite.

LECYTHIOCRINUS OLLICULÆFORMIS.

Fig. 4, side view of body enlarged to $1\frac{1}{2}$ diameters. Fig. 5, diagram of the same, in the same proportions.

ERISOCRINUS PLANUS.

Fig. 6, basal view of body, natural size. Fig. 7, view of oval side of the same. Fig. 8, similar view of the *Poteriocrinus hemisphericus* Shumard, for comparison.

CYATHIOCRINUS STILLATIVUS.

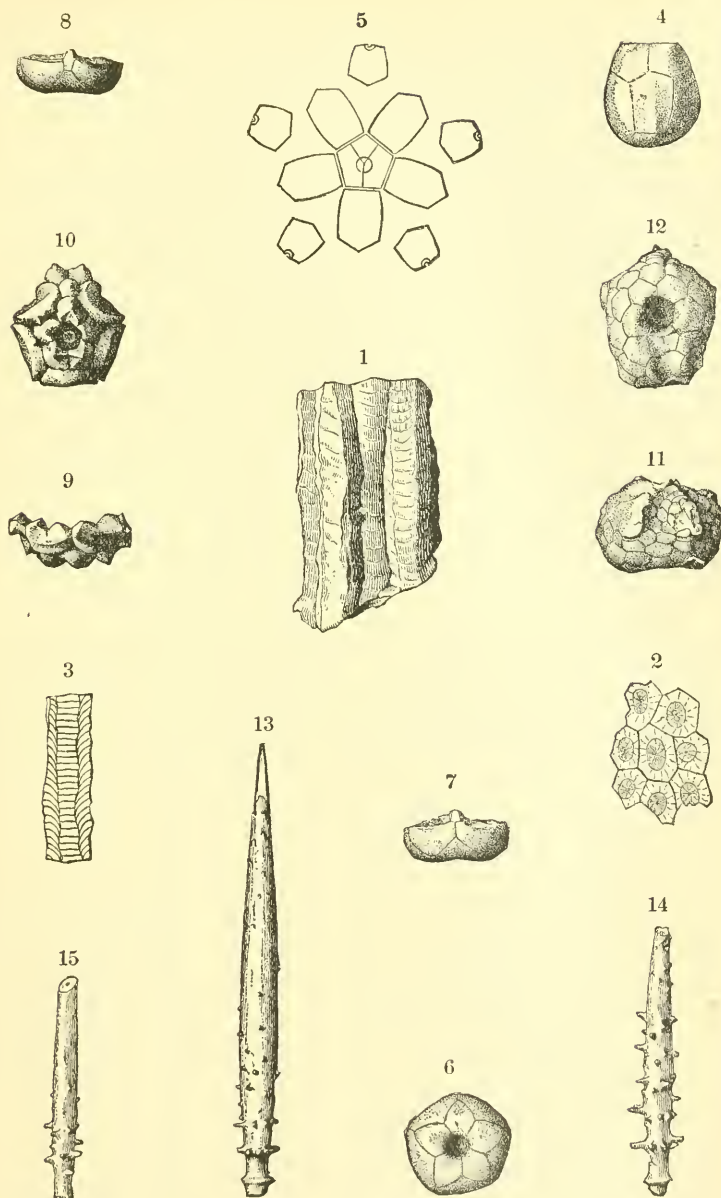
Fig. 9, side view of calyx, natural size. Fig. 10, basal view of the same.

RHODOCRINUS VESPERALIS.

Fig. 11, side view of the body, natural size. Fig. 12, basal view of the same.

ARCHÆOCIDARIS DININNIL.

Figs. 13, 14, and 15, views of different spines.



1, 2, and 3.—ACERVULARIA ADJUNCTIVA.
 4 and 5.—LECYTHOCRINUS OLLICULEFORMIS.
 6 and 7.—ERISOCRINUS PLANUS.
 8.—POTERIOCRINUS HEMISPHERICUS.
 9 and 10.—CYATHOCRINUS STILLATIVUS.
 11 and 12.—RHODOCRINUS VESPERALIS.
 13, 14, and 15.—ARCHLEOCIDARIS DININII.

**A STUDY OF THE TRUNK-FISHES (OSTRACIONIDÆ), WITH NOTES
UPON THE AMERICAN SPECIES OF THE FAMILY.**

By G. BROWN GOODE.

The fishes of the order *Plectognathi* have afforded a knotty problem to writers on systematic ichthyology. Many genera have been established, and, between them, the several species have been buffeted to and fro until their synonymy is tangled like a spider's web. The following historical sketch of the progress of opinion in the classification of the Ostracionts was drawn up as an aid in determining what generic names should be used for the common West Indian forms.

Artedi and Linnaeus were acquainted only with those which have the carapace closed behind the anal fin, now included by Günther in the subgenus *Ostracion*. The first of the other type, with carapace open behind the anal fin, was described by Houttuyn in 1782,* and again by Thunberg, under another name, eight years subsequently.† Schneider, Shaw, Lacépède, and their contemporaries recognized only the old genus, and it was not until 1838 that Dr. Gray separated certain species under the name *Aracana*.‡

Lacépède was the first to propose a division of the genus *Ostracion*, though he did not advocate the use of names for his subgenera, nor indeed propose any. His divisions were based upon the arrangement of the spines on the carapace, as given below. He knew no representatives of the *Aracana* type.

FIRST SUBGENUS.

No spines before the eyes nor under the tail.

1. L'OSTRACION TRIANGULAIRE (= *O. triqueter*).
2. L'OSTRACION MAILLÉ (= *O. triqueter*).
3. L'OSTRACION POINTILLÉ (= *O. punctatus*).
4. L'OSTRACION QUATRE-TUBERCULES (affinities unknown).
5. L'OSTRACION MUSEAU-ALLONGÉ (= *O. cubicus*).
6. L'OSTRACION DEUX-TUBERCULES (= *O. cubicus*).
7. L'OSTRACION MOUCHETÉ (= *O. cubicus*).
8. L'OSTRACION BOSSU (= *O. nasus*).

SECOND SUBGENUS.

Spines in front of the eyes but none under the tail.

9. L'OSTRACION TROIS-AIGUILLONS (mythical?).

* 1782. HOUTTUYN, M. Beschrijving van Eenige Japansche Visschen en andere Zeeschepselen. < Verhand. d. Holland. Maatsch. Wetenschappen, Haarlem, xx, 2, 1782, pp. 311-350. *Ostracion aculeatus*, p. 346.

† 1790. THUNBERG, C. P. Beskrifning på tvänne fiskar inifrån Japan <. Vetenskaps Acad. Nya. Handl. xi, 1790, p. 106 +. *Ostracion hexagonus*, p. 107.

‡ 1838. GRAY, J. E. < Ann. Nat. Hist. 1, p. 110.

THIRD SUBGENUS.

Spines under the tail but none in front of the eyes.

10. L'OSTRACION TRIGONE (= *O. trigonus*).
11. L'OSTRACION DOUBLE-AIGUILLON (= *O. bicaudalis*).

FOURTH SUBGENUS.

Spines in front of the eyes and under the tail.

12. L'OSTRACION QUATRE-AIGUILLONS (= *O. quadricornis*).
13. L'OSTRACION LISTER (= *O. quadricornis*).
14. L'OSTRACION QUADRANGULAIRE (= *O. cornutum*).
15. L'OSTRACION DROMADAIRE (= *O. turrilus*).

The next attempt at a subdivision was by Swainson in 1839,* and was based entirely upon the shape of the carapace. The peculiar features of this arrangement can most easily be shown by quoting in full from the preliminary synopsis (p. 194).

1. Sub-family OSTRACINÆ. Body mailed with angular plates.
 OSTRACION. Body quadrangular, destitute of spines.
 TETROSOMUS. Body quadrangular; spines on the back and belly.
 *Body triangular.
 Platycanthus. Body with several flattened bony obtuse spines.
 Lactophrys. Front and vent with two horn-like, acute spines.
 Rhinosomus. Body without spines, often scored as in the *Balistinæ*.

In the main body of the "Classification of Fishes, etc." (pp. 323-324), the definitions of genera and subgenera were expanded as follows:

I. Sub-fam. OSTRACINÆ.

Body smooth, quadrangular in the typical and triangular in the aberrant groups, covered by angulated bony plates, soldered at their sutures; dorsal fin one; no ventral fin; caudal rounded.

OSTRACION, Linn. Body quadrangular; destitute of spinal processes.

O. cubicus, Bloch. pl. 137. *nasus*, Ib. pl. 138.

TETROSOMUS, Sw. Body quadrangular; armed with spines on the back and belly.

T. turrilus, Bl. pl. 136.

Lactophrys, Sw. (fig. 102). Body triangular, armed with strong spines, curved backward just before the anal fin, and generally with two others, resembling horns.

L. trigonus, Bl. pl. 135.

cornutum, Bl. 133.

bicaudalis, Ib. 132.

quadricornis, Ib. 134.

Rhinosomus, Sw. Body triangular, entirely destitute of spines, and often scored or reticulated as in *Balistes*.

R. triqueter, Bloch. pl. 130. *concatenatus*, Ib. pl. 131.

Platycanthus, Sw. (*Acarana*, Gray). Compressed, subtriangular, with broad obtuse plates or spines scattered over the body and eyes.

P. auratus, Shaw. Nat. Miss. pl. 338.

It would be interesting to know what relations are indicated by the different kinds of type employed by the author. But for the direct

* 1839. SWAINSON, WILLIAM. The Natural History | of | Fishes, Amphibians, and Reptiles | or | Monocardian Animals. | By William Swainson, F. R. S., F. L. S., &c., &c. | ——— | in two volumes. | ——— | Vol. I (II). (Vignette.) | London: | Printed for Longman, Orme, Brown, Green, and Longmans, Paternoster Row, | and John Taylor, Upper Gower St., | 1839. Vol. ii, pp. 193, 323.

statement of a quadrangular character for *Tetrosomus* it would appear certain that the three following divisions were intended as subgenera, subordinated to *Tetrosomus*. As it is, it seems to be more than probable that an omission was made by the author, and that the diagnosis should read "triangular or quadrangular," for the species chosen as type of *Tetrosomus* is in fact pentagonal. This, however, would throw out *Rhinesomus* and certain species in *Lactophrys*. Be this as it may, we have no right to guess at the real meaning of the author; these divisions are treated as genera in every particular except that their names are in italics instead of capitals, and as genera they must be quoted, charging discrepancies to the account of carelessness and bad workmanship.

In 1855 the group underwent another revision at the hands of Dr. Kaup.* Besides forming several new subgenera for the *Acarana*-like forms he made a complete redistribution of the species among the genera. Regarding the triangular species as types of the genus *Ostracion* of Linnaeus he proposed a new generic name, *Oibotion*, for *Ostracion* as limited by Swainson, and in this group placed *O. tuberculatus*, *O. cubicus*, *O. punctatus*, *O. argus*, *O. cyanurus*, and *O. Sebae*. In "*Lactophrys*, Swains. (part)," he placed *O. cornutus*, *O. fornasini*, and *O. diaphanus*, all species with spinous, four-ridged carapaces, while in "*Ostracion*, Linn. (part), Kaup," which he regarded as equivalent to *Rhinosomus* and *Tetrosomus*, Swains., he placed all the triangular species, which he divided into five sections: "a. Without long spines over the eyes and on the edges of the body"—*O. triqueter*. "b. With spines near the anal fin"—*O. bicaudalis*, *O. trigonus*, and *O. oviceps* (= *O. trigonus*). "c. With spines over the eyes and on the edge of the carapace"—*O. quadricornis*. "d. With 2-3 short spines on the elevated dorsal ridge, short spines over the eye and upon the edges of the very broad carapace, diminishing with age to weak points"—*O. concatenatus*. "e. With strongly quadrangular body and much elevated back, provided with a strong spine; spines over the eyes and on the lower edges of the carapace."—*O. gibbosus*.

In the following year a fresh revision was undertaken by Prof. H. Hollard, of the Faculty of Sciences at Poitiers,† who reassembled in the one genus, *Ostracion*, all the species with a post-abdominal bridge to the carapace, retaining for the others the name *Aracana*, Gray. In this usage he is followed by Dr. Bleeker in his later publication, though he freely admits that earlier in his career as an ichthyologist, impressed like his predecessors by the diversified forms of the known species of *Ostracionts*, he was inclined to believe that many genera could be distinguished among them. "But," he continues, "in searching for characters which should define them satisfactorily, I discovered that I could

* Op. cit., pp. 214-221.

†1856. HOLLARD, H. Monographie de la Famille des Ostracionides. <Annales des Sciences Naturelles, 4^e ser. Zool. vii, 1857, pp. 121-170.

find none." Bleeker admits three genera, *Ostracion*, *Aracana*, and *Centaurus*, the latter founded on a grotesque form known to ichthyologists only from a drawing of a very young individual made by Dr. Hooker. *Ostracion* is divided by Bleeker into subgenera as follows:

Ostracion, Art. = *Tetrosomus*, Swns. = *Rhinesomus*, Swns. = *Latophrys*, Swns. = *Cibotium*, Kp.

Pyxis postice integra basin pinnæ dorsalis et analis includens, medio inferne plana non carinata. Pinna dorsalis. Pinna caudalis radii 10 (1 | 8 | 1). Spec. typ. *Ostracion tetragonus*, L.

Subgenus *Ostracion*, Art. Pyxis tetragona, trigona vel pentagona, anacantha. Spec. typ. *Ostracion tetragonus*, L.

Subgenus *Latophrys*, Swns. Pyxis trigona vel pentagona, utroque latere carina ventrali postice spina armata. Sp. typ. *Ostracion trigonus*, L.

Subgenus *Tetrosomus*, Swns. Pyxis trigona vel pentagona orbitis, crista dorsali mediana carinisque ventralibus acanthophora, spinis orbitalibus sursum nec antrosum directis, ventralibus pluribus. Spec. typ. *Ostracion turritus*, Forsk.

Subgenus *Acanthostracion*, Blkr. Pyxis trigona, pentagona, vel tetragona orbita carinaque ventrali postice acanthophora, spinis orbitalibus antrosum directis. Spec. typ. *Ostracion quadricornis*, L.*

These divisions correspond very closely to those of Lacépède already referred to; *Ostracion* being equivalent to section 1, *Latophrys* to section 3, while section 4 is about equally divided between *Tetrosomus* and *Acanthostracion*.

Dr. Günther,† like Hollar and Bleeker, considers the typical *Ostracions* to be embraced within the limits of one natural genus, and even includes those with carapace open behind the anal fin. Such, at least, is his course in the generic diagnosis of *Ostracion*, though he actually adopts the name *Aracana* as if it represented a true genus, and enumerates the species under a separate series of numbers.

In arranging the species of *Ostracion* he adheres rather to the method of Swainson than of Lacépède, considering the shape of the carapace to be the most convenient basis of classification. His divisions are as follows:

- I. Carapace three ridged.
- II. Carapace four or five ridged, without spines.
- III. Carapace four ridged with spines.

The third division corresponds exactly to Swainson's *Tetrosomus*, if his diagnosis be accepted without change, the second division to Swainson's *Ostracion* and Kaup's *Cibotium*, the first division to the three last subgenera (?) of Swainson, which he probably meant to subordinate to a third genus which he neglected to name.

The usage of American authors has been various. Storer, although he described his Holmes' Hole specimen under the name *Ostracion Yalei*, accepted in his "Synopsis" the names *Rhinesomus triqueter* and *Latophrys sexcornis*.

* Atlas ichthyologique, v, 1805, pp. 27-28.

† Catalogue of the Fishes in the British Museum, viii, 1870, p. 256.

Professor Gill, in 1873, catalogued the east coast species as *Lactophrys trigonus*.*

Poey, in his "Synopsis Piscium Cubensium,"† follows the lead of Bleeker, accepting his subgenera though not bracketing them into the middle of the binomial names as was the practice of the Dutch zoologist. In a later work, the "Enumeratio Piscium Cubensium," he adopts the genera *Ostracion*, *Acanthostracion*, and *Lactophrys*. Jordan uses the name *Lactophrys quadricornis*, accepting provisionally Swainson's arrangement.

After studying the group, as represented in the collections of the National Museum, I am unable to recognize any characters sufficiently persistent to serve in dividing the typical *Ostracions* into genera. The most dissimilar forms are connected by others, intermediate in character, and a series of specimens in various stages of growth of a single species like *O. quadricornis* or *O. concatenatus* shows great age-variation both in shape of carapace and in size and distribution of spines.

As has been remarked, Lacépède and Bleeker regarded the position of the spines as the most reliable character for classification.

Hollard sums up his observations on the specimens in the Paris Museum as follows:

"The diversity of species at a first glance appears greater than it is in reality; at least it is easy to reduce them to a small number of typical forms. The true types are those based upon form. The absence, the presence, and the number of the spines, large or small, with which many of the *Ostracionts* are provided, afford characters of very secondary and simply specific value. These spines in fact are present or absent without regard to more important characters. * * * They should be subordinated to other differences between which no known examples form connecting links."‡

Kaup and Swainson, on the other hand, adopted the form of the carapace as the most important character. This was considered by Hollard as of but little value for generic diagnosis, and by Bleeker is disposed of most summarily. "The triangular or quadrangular form of the body," he remarks, "appears to have no real value (for the separation of genera) since it depends simply upon the greater or less convexity or elevation of the dorsal plane of the carapace. If, for example, we place an *Ostracion triqueter*, L., by the side of an *Ostracion tetragonus*, L. (= *O. cubicus*), we have before us two well-marked types, one with a triangular the other with a quadrangular carapace (*Ostracion*, Kaup, and *Cibotium*, Kaup). But if between these two extremes we place an *Ostracion guineensis*, Blkr., and an *Ostracion nasus*, Bl., we cannot decide whether we are dealing with a triangular or quadrangular form, for the dorsal surface is elevated in the shape of a roof, presenting two faces which descend from a central crest to unite at an obtuse angle with the

* Rep. U. S. Com. Fisheries, part i, p. 793.

† Repertorio Físico-Natural de Isla de Cuba, ii, 1865, pp. 439-442.

‡ Annales des Sciences Naturelles, vii, p. 140.

lateral walls of the carapace. It is evident, from the study of these transitions, that the form of the carapace cannot furnish a certain basis for the establishment of distinct genera.

"The character of the spines has, however, a greater value than that of the form of the carapace. Although it be true that spines do not occur exclusively upon this or that form of carapace, since there are triangular trunk-fishes without spines, others armed with frontal and anal spines, and others with anal spines alone, while there are also quadrangular ones, spineless, or armed on the forehead and beneath the tail, still there may be observed a certain consistency in their arrangement as regards their position, their form, their number, and their direction. But this constancy does not extend to their persistency since some spines, or indeed all of them, are absorbed and disappear entirely in adult individuals of certain species. In this manner all the spines disappear with age in *Ostracion concatenatus*, and if one were disposed to see generic characters in its arming, three genera might be founded upon *Ostracion stellifer*, Bl., Schn. (in which the forehead, the dorsal keel, and the ventral ridge are spinous), *Ostracion bicuspis*, Blum., figured by A. Smith (which has only dorsal and ventral spines), and *Ostracion concatenatus*, Bl. (which has the carapace entirely spineless). In reality these species are merely nominal; *Ostracion stellatus* and *Ostracion bicuspis* being young individuals of the species of which *O. concatenatus* is the adult. In one other species, *Ostracion cornutus*, Linn. (not Bloch), the spines in the middle of the lateral dorsal ridge, and those on the ventral ridge, decrease with age, and in the adult finally disappear. In other species the spines are much more constant, but their proportions, very different in accordance with the age of the individual, render it sufficiently evident that they afford a character of very doubtful value. I should, however, note the fact that there is no known example of an *Ostracion* with horizontal frontal and anal spines in which these spines disappear in adult age."

As has already been stated, the subgenera adopted by Bleeker are founded solely upon the number and position of the spines. In *Tetrostomus* he places one pentagonal species, but in *Acanthostracion* and *Ostracion* he includes triangular, tetragonal, and pentagonal forms without discrimination. Notwithstanding the strong grounds taken by him in regard to the importance of the shape of the carapace it seems to afford the most reliable guide in an arrangement of the species of this genus. An arrangement with reference to the position of the spines produces some incongruous results, while the other plan harmonizes to a great extent with all structural features as well as with the geographical distribution of the group. Holland remarked that the serial gradation of the species was of great interest, but he did not work it out with the care which might have been expected. I have endeavored to indicate what seems to me to be a natural series, from the triangular spineless form through the pentagonal form, provided with many spines, to the tetragonal spineless form at the other extreme.

Serial arrangement of the species of Ostracion.

- I. Form triagonal, spineless *O. triqueter*.
- II. Form triagonal, with two ventral spines *O. trigonus*, *O. bicaudalis*.
- III. *a.* Form triagonal, with two ventral and two horizontal frontal spines, the posterior extension of whose base gives in young individuals a semblance to a tetragonal, in adults to a pentagonal shape *O. quadricornis*.
b. Like the last in every respect except that there is a median dorsal spine. (This is frequently seen in the young of *O. quadricornis*, disappearing at different stages of growth in different individuals, but in others persistent) *O. quadricornis*, subspecies *notacanthus*.
- IV. *a.* Form subtriagonal, approaching to pentagonal, the posterior extension of the orbital crest being more pronounced than in III. Frontal spines small, vertical, frequently double, two small spines upon the dorsal ridge and two on each ventral keel, all the spines obsolescent with age *O. concatenatus*.
b. (A side-shoot from *a.*) Like the last, but with all characters exaggerated and more persistent, the dorsal spine single and high, the spines on each lateral keel four in number.
O. turritus (by Günther considered to be probably identical with *O. concatenatus*).
- V. *a.* Form subtetragonal, approaching pentagonal, but with a dorsal surface clearly defined, though the affinity to the triagonal forms is indicated by a pronounced elevation of the dorsum, surmounted by a high spine. Frontal spines horizontal, stronger. The fullness of the anterior part of the body observed in the forms already studied is suggested by a bulging of the ventral surface *O. Fornasini*, *O. cornutus*, Linn. = *O. diaphanus*, Schn.
In *O. diaphanus* the dorsal surface is flatter than in *O. Fornasini*, but there are small spines on the dorsal and ventral keels, obsolescent in age, which suggest the preceding form. The two forms together, or an average between them, form a needed link in the series.
b. (A side-shoot with great development of frontal and ventral spines.) Forms similar to the last but approximating still more closely to the tetragonal, particularly in adult age; without dorsal spine, though with a trace of its presence in an elevated dorsal ridge. Horizontal spines very prominent.
O. arcus, Schn. = *O. cornutus*, Bloch.
- VI. Form tetragonal, spineless, similar to the last, but with squarer angles. "A more or less sharp protuberance in front of the dorsal fin, from which several pointed lines radiate." Horizontal spines absent. This is the transition from the subpentagonal and subtetragonal to the truly tetragonal forms.
O. ornatus.
- VII. *a.* Form tetragonal, spineless, similar to the last, but with lower though still very distinct dorsal ridge. A trace of rostral prominence *O. nasus*.
b. (Side-shoot from *a.*) Similar to *a.*, but with prominent rostral hump.
O. rhinorhynchus.
c. Form truly tetragonal, back convex, not ridged, dorsal and ventral keels blunt *O. cubicus*, *O. punctatus*, *O. sebae*.
- VIII. Form tetragonal, spineless, back flat, ridges sharp *O. Renardi*, *O. solorensis*.

Such is the continuity of the gradation in this series that it is almost impossible to distribute the species into subgenera, though the extreme forms would be considered by many writers as belonging to well-marked genera were the intermediate forms not known. The transition is perfect, without a break from *O. triqueter* to *O. Renardi* and *O. solorensis*. Even the size, abundance, and distribution of the spines are seen to be correlated to the shape of the body, for these are to be regarded, as

was suggested by Hollard, merely as exaggerations of the crests and ridges which define the lateral, dorsal, and ventral surfaces of the carapace, occurring in those parts of the body and in that part of the above series where these crests and ridges are most emphasized, and their absence coinciding with the absence of prominent lines of demarcation. They are most numerous in the middle portion of the above series, in the forms transitional between the triangular and tetragonal sections of the genus, and are alike also at both extremes.

The geographical distribution of the species is interesting in the light of this gradation. The triangular forms (I and II) occur only in the West Indies. The next in order (III) occur not only in the West Indies but in the southeastern Atlantic. The subtriangular form (IV) is represented in the southeastern Atlantic (at the Cape of Good Hope), in the western Pacific (China), in Australia and the East Indian Archipelago. The subtetragonal forms (V) are represented in the Indian Ocean, west to the Cape of Good Hope, in Japan and Australia, and in the East Indian Archipelago, while the tetragonal forms (VI, VII, and VIII) almost exclusively in the Indian Archipelago and the Indian Ocean.

There is no dearth of names for the sections of this group, but as has been remarked, it is impossible to assign them or subdivide the genus by any but arbitrary methods.

Swainson's *Ostracion* corresponds to Divisions VI, VII, and VIII; his *Tetrosomus* to Divisions IV and V, although he assigns *O. cornutus* to the following genus; his *Lactophrys* to Divisions II and III, and his *Rhinesomus* to Division I.

Kaup's *Ostracion* would include Divisions I, II, III, and IV; his *Lactophrys*, Division V; and his *Cibotion*, Divisions VI, VII, and VIII. Bleeker's *Ostracion* includes I, VI, VII, and VIII; his *Tetrosomus*, IV; his *Acanthostracion*, II, III, and V.

Dr. Bleeker by assuming Division V, instead of Division I, as one extreme of the series, made his division of the group into subgenera more plausible. This arrangement does not, however, allow as complete a gradation of form.

SUBORDER OSTRACODERMI,* GILL.

Synonym as family name.

- < *Sclerodermes*, CUVIER, Règne Animal. 1st ed. ii, 1817, p. 153; 2d. ed. ii, 1829, p. 375.
 < *Sclerodermi*, GÜNTHER, Cat. Fish. Brit. Mus. viii, 1870, p. 207. (Synonym as subordinal name.)
 < *Sclerodermes*, HOLLARD, Ann. Sci. Nat. (4) xiii, 1860, p. 31.

Synonyms as ordinal names.

- < *Sclerodermi*, BONAPARTE, Giorn. Accad. di Scienze, lii, 1832 (Saggio Distrib. Metod. Animali Vertebr. a Sangue Freddo, p. 39).

*The synonymy of this suborder is in substance quoted from GILL. MS.

- = *Ostraciones*, BLEEKER, Enum. Sp. Pisc. Archip. Indico, xiv, 1859, Atlas Ichthyologique, v, 1865, p. 25.
 = *Ostracodermi*, GILL, Arrangement of the Families of the Fishes, 1872 (November), pp. xii, i.
 = *Cataphracti*, FITZINGER, Sitzungsber. k. Akad. Wiss. (Wien), lxxvii, Abth. 1, 1873, p. 47.

FAMILY OSTRACIONTIDÆ.

- Ostracidi*, RAFINESQUE, Indice d'Ittiolog. Siciliana, 1810, p. 39 (Gill).
Ostracidia, RAFINESQUE, Analyse de la Nature, 1815 (as subfamily, *fide* Gill).
 Subfam. *Ostraciinae*, SWAINSON, Nat. Hist. Fish. Amphib. and Rept. 1839, ii, pp. 194, 323.
Ostraciontini, BONAPARTE, Nuovi Annali d. Sci. Nat. ii, 1838, p. 131; iv, 1840, p. 186 (as subfamily, *fide* Gill); NARDO, l. c. inf. p. 71.
Ostraciontidae, NARDO, Atti Congressi Scienz. Ital. rac. et ord. i (1842), 1844, p. 70 (Gill).
Ostraciones, BLEEKER, Bijdrage, Balist. en Ostraciones van den Ind. Archip. 1852, pp. 28-36.
 (Family) *Ostraciontidae*, GILL, Arrangement of the Families of Fishes, 1872, p. 1.
 (Family) *Ostracionidae*, KAUP, Archiv für Naturgeschichte, 1855, pp. 215-221.
 Famille des *Ostracionides*, HOLLARD, Annales des Sciences Naturelles, vii, 1856, pp. 121-170, pl. xiii.
 Familia *Ostracionoidei*, BLEEKER, "Enum. sp. Pisc. Archipel. Ind. xiv, 1859;" Atlas Ichthyologique, v, 1865, pp. 24-42, ppl. cci-cciv.
 Group *Ostraciontina*, GÜNTHER, Catalogue of the Fishes in the British Museum, viii, 1870, pp. 255-268.
Ostraciidae, COPE, Proc. Amer. Assoc. Adv. Sci. xx, 1872, p. 340; GOODE, Cat. Fish Bermudas, 1876, p. 53 (name only); GILL, Bibliog. Fish Pacific Coast (unpublished).
Ostraciontes, FITZINGER, l. c. sup.

DIAGNOSIS OF FAMILY.

Plectognath fishes with short, angular bodies, covered by a modified integument consisting of numerous closely juxtaposed polygonal osseous plates. Caudal peduncle, bases of fins, and snout covered with flexible skin. Maxillary and intermaxillary bones anchylosed. A single row of short teeth in each jaw. A single dorsal fin opposite the anal; no ventrals. Vertebrae 14, the first 9 elongate. No ribs.

SYNOPSIS OF GENERA.

- Carapace forming a continuous bridge behind anal fin, ventral surface acarinate, caudal with 10 rays OSTRACION (Art.) Linn.
 Carapace open behind anal fin, ventral surface carinate, caudal with 11 rays or more. ARACANA, Gray.

GENUS OSTRACION.

- > *Ostracion*, ARTEDI, Gen. Pisc. 1738, p. 55.
 = *Ostraciones polyodontes*, ARTEDI, l. c.
 = *Ostracion*, LINNÆUS, Syst. Nat. ed. x, 1758, l, p. 330; ed. xii, 1766, p. 407.
Les Ostracions, LACÉPÈDE.
Les Coffres (Ostracion L.), CUVIER, Règne Animal. ed. 1, 1817, p. 154; ed. ii, 1829, p. 375.
Ostracion, GRAY, Annal. Nat. Hist. 1, 1838, p. 110.
Ostracion + *Tetrosomus* + *Lactophrys* + *Rhincosomus*, SWAINSON, Nat. Hist. Fish. Amphib. and Rept. 1839, ii, pp. 193-194, 323-324.
Ostracion, BLEEKER, Verhandelingen van het Bataviasch Genootschap van Kunsten en Wetenschappen, xxiv, 1852, Bijdrage tot de Kennis der Balistini en Ostraciones van den Indische Archipel. p. 28; Atlas Ichthyologique, v, 1865, pp. 25-42.

Ostracion + *Cibotus* + *Lactophrys*, KAUP, Arch. für Naturgeschichte, 1855, pp. 215–219.
Ostracion (— *Aracana*), GÜNTHER, Cat. Fish Brit. Mus. viii, 1870.
Ostracion, POEY, Rep. Fis. Nat. Cuba, ii, 1868, pp. 439–442.
Ostracion, HOLLARD, Annales des Sciences Naturelles, vi, 1856, p. 140.
Ostracion + *Lactophrys* + *Acanthostracion* + *Rhinesomus* + &c., POEY, Enum. Pis. Cu-
 bens. 1876, pp. 174–176.

DIAGNOSIS OF GENUS.

Ostracions with triangular, tetragonal, or pentagonal carapaces, the ventral surface always flat or concave, acarinate. Carapace continuous behind anal fin. Ventral spines always associated with frontal spines, if the latter are present. Dorsal fin with 9, occasionally 10 rays. Caudal fin with 10 (1 | 8 | 1) rays.*

As limited by Linnaeus in the tenth edition of the *Systema Naturæ* the diagnosis stood as follows:

164. OSTRACION *Caput: Dentes* utrinque 10 porrecti, teretes, obtusiusculi *Apertura*
Corpus osse integro obtectum. Pinne ventrales nullæ.

Habitat.—Tropical and temperate seas, the triangular species confined to the western Atlantic.

SYNOPSIS OF AMERICAN SPECIES.

Carapace triangular.

Carapace spineless	O. TRIQUETER, L.
Carapace with ventral spines—	
* continuous behind dorsal	O. BICAUDALIS, L.
** open behind dorsal	O. TRIGONUS, L.
Carapace with ventral and frontal spines—	
* dorsal spine not present in adult age, seldom in young	O. QUADRICORNIS, L.
** dorsal spine persistent	O. QUADRICORNIS subsp. NOTACANTHUS.
(** * dorsal spine large, associated with four or more ventral spines.	
	O. TURRITUS, Forsk., L.)

* The following is as nearly as possible a fac-simile of the original generic description of Artedi :

XXXIX. OSTRACION.

Membrana Branchiostega nulla.

Figura Corporis insolens, nempe vel globosa seu sphaerica, vel subrotunda, vel ovata seu oblongo rotunda, vel oblongo quadrangulata, vel conica fere. *Cutis dura* saepe spinis seu aculeis magnis vel in toto corpore, vel in aliqua ejus parte, armata; interdum vero glabra.

Pinnæ Ventræles desunt Numerus Pin-
narum quinquarius, nempe duæ Pecto-
rales seu laterales; una dorsi; una Ani
una Caudæ.

Os exiguum: Dentes magni. Oculi cute commune tecti.

Foramina narium utrinque duo ante oculos Labia reductabilia dentes ad partem tegunt,

Carapace tetragonal.

(Carapace with ventral and frontal spines.....O. ARCUS, L.)

NOTES ON AMERICAN SPECIES.

OSTRACION TRIQUETER, Linn.

Ostracion triqueter, LINNÆUS, Syst. Nat. ed. x, 1758, 1, p. 330, No. 1, ed. xii, 1766, 1, p. 407.—BLOCH, Ichthyologie, iv, 1787, p. 106, taf. cxxx.—GMELIN, Linn. Syst. Nat. i, 1788, p. 1441.—LACÉPÈDE, Hist. Nat. Poiss. etc., i, 1793, p. 444; ed. ii, 1819, ii, p. 331, pl. xiv, fig. i.—SCHNEIDER, Bloch, Syst. Ichth. 1801, p. 493.—SHAW, Gen. Zool. v, 1804, p. 420.—CUVIER, Règne Animal, ed. i, 1817, p. 154; ed. ii, 1829, ii, p. 376, note.—MÜLLER & GROSCHEL in Schomburgk's Hist. Barbados, 1848, p. 677.—KAUP, Arch. für Naturg. 1855, p. 217.—HOLLARD, Ann. Sci. Nat. vii, 1856, p. 154.—BLEEKER, Atl. Ichth. v, 1865, p. 26.—GÜNTHER, Cat. Fish Brit. Mus. viii, 1870, p. 256.

Ostracion triqueter, POEY, Mem. Sob. Hist. Nat. Cuba, ii, 1861, p. 361; Rep. Fis. Nat. Cuba, ii, 1868, p. 442; Enum. Pisc. Cubens. 1876, p. 176.

Ostracion triqueter, COPE, Trans. Am. Phil. Soc. 1870, p. 475.—GOODE, Cat. Fish Bermudas, 1876, p. 23; Amer. Jour. Sci. and Arts, 1877 (Oct.), p. 290.

Rhinesomus triqueter, SWAINSON, Nat. Hist. Fish. Rept. and Amphib. 1839, ii, p. 323.

Piscis triangularis ex toto cornibus carens, LISTER in App. Willughby Hist. Pisc. 1636, p. 20.—RAY, Syn. Method. Pisc. p. 45, No. 9.

Ostracion triangularis, tuberculis exiguis immixtis, aculeis carens, ARTEDI, Gen. Pisc. 1738, p. 57, No. 10; Syn. Pisc. 1738, p. 85, No. 14.

Ostracion polyodon inermis triqueter, LINNÆUS, Mus. Adolphi Frederici, i, 1754, p. 60.

L'Ostracion maille, LACÉPÈDE, l. c.

Cuckold, Bermudas.

Chapin, Cuba.

Drunken-fish, Trunk-fish, Plate-fish, or Fair Maid, Barbados.

DISTRIBUTION.

Bermudas (Goode).

Jamaica (Günther).

Cayenne (Günther).

Cuba (Poey).

Gulf of Mexico (Holland).

Bahia (Castelnau).

St. Martin (Cope).

Tortugas (National Museum).

Trinidad (Günther).

Barbados (Schomburgk).

St. Croix (Cope).

Mexico (Holland).

Brazil (Cope).

Vera Cruz (Cope).

Ostracions with triangular carapace, without spines. Height slightly greater than half the length of the body without the caudal, breadth equal to half the length of the body in adults, greater in young. Ventral surface of carapace convex anteriorly, concave posteriorly. Back elevated compressed, sides joining at an angle of about thirty degrees. Carapace continuous behind dorsal fin. Head contained three times in length of body. Interorbital space concave. Upper surface of snout concave. Diameter of eye contained eight to nine times in total length, four to four and one-half in height of side.

Teeth long, spike-like, eight to ten in upper jaw; eight to ten in lower jaw.

Scales of the sides hexagonal, in young with striae radiating from

centre to angles of each scale, in adult armed simply with tubercles, nine to ten, in longitudinal series from gill-opening to tail, eight in median line of ventral surface, eight between ventral keel and angle of back. Posterior dorsal scute unarmed.

Branchial aperture oblique, its length greater than the diameter of the eye, descending before the base of the pectoral. Fins obtusely rounded. Pectoral equalling in length. Caudal of moderate length and rounded.

Radial formula D. 10, A. 10, P. 12.

Color: The color of living individuals is thus recorded in my Bermuda note-book:—"Dark-brown, thickly studded with circular spots of yellowish white, each about two lines in diameter; the position of these spots appears to have no relation to the shape of the plates of the carapace. Ventral surface lighter and spotless. The epidermis is often abraded leaving the shell uniform tawny-white. The lips, bases of the fins, and tail-stem are brown like the ground color of the body." In dried specimens the epidermis dries and loses its color, and the shell shows through with a lighter shade. Günther states that the lips, roots of the fins, root of the tail, and tip of the caudal are black. This I have not observed.

The largest individuals seen by me measured about 265 millimetres in length, but these were quite unusual in size.

The Cuckold is common throughout the West Indies, and has been found south to Bahia, while, to the north, it is carried by the Gulf Stream as far as the Bermudas. Its limits of distribution are more closely restricted to the Caribbean Sea and the neighboring waters than those of any other species in the genus.

It is recorded that the crew of Columbus, on their first voyage, in 1492, while at anchor on the coast of Cuba, captured a fish which "was like a swine, all covered with a very hard skin, no part whereof was soft but the tail," which was probably one of the Ostracions.

Little can be said in reference to its habits, except that it is sluggish and lives close to the bottom, where it probably feeds upon hydroids, ascidians, and other soft-bodied animals. This is somewhat conjectural for no one has ever taken the pains to examine the stomach contents of any member of the genus, but it is not very hazardous to make this surmise, for the sluggish movements of the Trunk-fish would not permit it to pursue active living prey, while its small, weak teeth are thoroughly unsuitable for feeding upon shells and barnacles.

The method of locomotion in this and other members of the genus Ostracion is very peculiar. When in Bermuda, in 1872, I had two of them for a time in my aquarium, and had an excellent opportunity of observing the movements of their fins.

The rigid shell prevents any flexure of the body, the only parts with power of independent motion being the lips, the dorsal and anal fins, and the stem of the tail. These protrude through openings in the cara-

pace, and the bases of the fins as well as the lips are encased in tough skin, leathery and flexible. Even the gill-openings are incapable of independent motion, for they are only straight, narrow, vertical slits in the carapace just in front of the pectoral fins.

The sinuous muscular movement of the posterior half or two-thirds of the body, which plays so important a part in the movement of the ordinary fish, is of course impossible, and the rotary, sculling motion so noticeable in the caudal fin of a fish, like a minnow or a trout, seems equally unknown. The power of propulsion appears to be vested chiefly in the dorsal and anal fins. These are broad and round, provided apparently with strong muscles, and the anal is placed almost directly beneath the dorsal. When the fish moves it is solely by the effect of a strong, slow, regular half-rotary movement of these two vertical fins, much resembling that of the screw-wheel of a propeller-engine. The caudal fin is kept vertical, and, moved from side to side, plays the part of a rudder, except when needed for an unusually rapid movement, and then it adds its strength with long, strenuous side-strokes. There are no ventral fins, nor do they seem to be needed, for the fish is balanced upon its centre of gravity and well under the control of its propulsive fins. The pectorals probably perform a certain part in balancing, but seem to be most useful in keeping up a circulating current through the gill-apertures.

Their movements are sluggish, and they do not seem to require a rapid aeration of the blood, for I have known them to live for two or three hours out of water, and when restored seem none the worse for the change of element, save that for a time they were prevented from sinking to the bottom by the air which they had swallowed and which kept them awkwardly suspended at the surface.

I have rarely seen them swimming among the reefs. They appear to spend most of the time resting on the bottom, on the broad nether surface of the carapace. They never take the hook, but often enter the fish-pots set at a depth of two to ten fathoms.

No one has been so fortunate as to observe the breeding habits of the Ostracions; even the time of spawning is unknown.

In the Bermudas they are sometimes eaten, though not held in high estimation. I was unable to learn that evil effects ever follow their use for food at this locality. Hollard states that its flesh is said to be palatable and wholesome, but cites no authority for this observation, which is probably taken second-hand from Lacépède, who gives an enthusiastic eulogy of its good qualities. "Its flesh," wrote the fluent Gaul, "is more sought after than that of almost any other fish in the seas of America where it makes its home." And then he continued with a most amusing proposition for acclimating the species in the waters of France, and which is a good example of the theories of the would-be fish-culturists of eighty years ago. "Although it appears to thrive only in tropical regions we might endeavor to acclimate it in

waters more remote from the equator, since the differences of temperature presented by the water at different degrees of latitude are far less marked than those of the atmosphere. On the one hand we know with what facility fishes found only in the sea can be habituated to life in fresh water. The exquisite flavor and exceedingly wholesome nature of the flesh of the 'triangulaire' should encourage us to make persevering and well considered experiments in this direction; we might accomplish this acclimation, which would be important from more than one point of view, by gradual steps; we should gradually accustom the species to temperatures successively less warm; we should even continue the experiment through many generations of the animal before abandoning it completely, without artificial protection, to the climate in which it is to be naturalized. We should do for the 'triangulaire' what has been done for many species of plants; we should bring individuals of this species, and we should care for them through a long period in water, which we should keep at a temperature closely resembling that of the equatorial seas in their surface strata; then we should lower the temperature of the little pools in which the 'triangulaires' are kept by almost insensible degrees and by very gentle variations. In the regions of Europe and other parts of the globe, far removed from the tropics, where the thermal currents flow, we might at least profit by these naturally heated waters to give to the triangulaires that degree of heat which is to them absolutely necessary, or to accustom them by insensible degrees to enduring the ordinary temperature of the fresh waters or of the seas of those various regions."—(Lacépède, l. c.)

OSTRACION BICAUDALIS, Linn.

Ostracion bicaudalis, LINNÆUS, Syst. Nat. ed. x, 1758, i, p. 330, No. 3; ed. xii, i, 1766, p. 408.—BLOCH, Ichthyologie, iv, 1787, p. 109, p. cxxxii.—GMELIN, Linn. Syst. Nat. i, 1788, p. 1441.—LACÉPÈDE, Hist. Nat. Poiss. etc., i, 1798, pp. 465–466; ed. ii, 1819, pp. 342–343.—SCHNEIDER, Bloch, Syst. Ichth. 1801, p. 499.—SHAW, CUVIER, Règne Animal, ed. i, p. 154; ed. ii, 1829, ii, p. 375.—KAUP, Archiv für Naturg. 1855, p. 217.—HOLLARD, Ann. Sci. Nat. vii, 1856, p. 153.—POEY, Rep. Fis. Nat. Cuba, ii, 1868, p. 442.—GÜNTHER, Cat. Fish Brit. Mus. viii, 1870, p. 257.

Ostracion bicaudale, POEY, Mem. sob. Hist. Nat. Cuba, vi, 1861, p. 362.

Ostracium bicaudale, COPE, Proc. Amer. Phil. Soc. 1870, p. 474 (St. Martins).

Lactophrys bicaudalis, SWAINSON, Nat. Hist. Fish, Rept. and Amphib. 1839, ii, p. 323.—POEY, Enum. Pisc. Cubens. 1876, p. 176.

Piscis triangularis, parvus non nisi imo ventre cornutus, LISTER, in App. Willughby Hist. Pisc. 1686, xiv, p. 20.—RAY, Syn. Method. Pisc. 1713, p. 45.

Piscis mediocris triangularis, ad inum ventrem prope caudam tantum cornutus, etc., LISTER, l. c. p. 20.—RAY, l. c. p. 45.

Ostracion triangulatus, tuberculis hexagonis radiatis, aculeis duobus in imo ventre, ARTEDI, Gen. Pisc. 1738, p. 57, No. 9; Syn. Pisc. p. 85, No. 13.

Ostracion triangulatus totius maculosus ac tuberculosus, aculeis duobus in imo ventre, ARTEDI, Gen. Pisc. p. 57, No. 8; Syn. Pisc. 85, No. 12.

Chapino, PARRA.

Trunk-fish, Jamaica

Chapin, Cuba.

DISTRIBUTION.

Jamaica (Günther).	Barbados (Schomburgk).
Antilles (Hollard).	Jamaica (National Museum).
St. Martins (Cope).	Belize, Honduras (Günther).
Cuba (Poey).	Island of Ascension (Günther).

Ostracions with triangular carapace and with flat prominent spine on each ventral ridge. Breadth of body less than half its length without caudal.

Space between eyes concave. From the median dorsal line the sides of the back descend rapidly, curving outward slightly. Caudal fin rounded.

Color yellowish, with numerous small round brown spots on carapace, tail, and caudal fin. D. 10, A. 10, P. 12.

The Brown-spotted Trunk-fish has a wider distribution to the south than the Cuckold, having been recorded by Dr. Günther from the Island of Ascension, where a young individual was taken by Mr. J. Robinson. It is also in Mr. Osbert Salvin's Honduras collections. It has not yet been recorded from the coast of Florida, or to the north of Cuba.

It attains a much larger size than the preceding. Hollard gives the following dimensions for one of the largest in the Museum d'Histoire Naturelle:

	M.
Length	0.440
Maximum height	0.143
Length of head	0.090
Tail-stem	0.080
Caudal	0.080
Breadth of abdomen	0.110

The Trunk-fishes appear to have been objects of curiosity in the early days of American exploration, and were evidently among the choicest treasures of the primitive museums of the seventeenth and eighteenth centuries. Their strange shapes naturally attracted the attention of travellers, and then, as now, the ease with which their shells could be preserved made them favorites of curiosity hunters. No group of tropical fishes is so thoroughly worked out in the writings of "the fathers" as the Plectognaths, and none more so than the Ostracions. Over two hundred years ago every species of *Ostracion* now known from the western Atlantic had been named and described by the naturalists of northern Europe, and it is a well-deserved tribute to their discrimination as zoologists to say that none of the many efforts which have since been made to subdivide these species have been at all successful.

Artedi in his notes upon the different forms of *Ostracion* mentions the various collections in which he observed specimens. The "Naggs' head," "White Bear," and the "Green Dragon in Stepney," to which he very often alludes, seem to have been London taverns where curiosities were kept. He also speaks of seeing them in the museum of Hans Sloane, the nucleus of the British Museum; also in the collections of D.

Seba, in Amsterdam, of Mr. Lillja, in London, of Mr. (Don) Salteros, in Chelsey, and of seeing various specimens at Stratford, and "in spring-garden." No other kinds of fishes appear to have been preserved except "*the monk- or Angel-fish Anglis, aliis Mermaid-fish*," probably a species of *Squatina*, which he saw in London at the Naggshead and in the town of Chelsey. The art of taxidermy was evidently not thoroughly established in 1738.

Of *Ostracion bicaudalis*, he remarks, "Vidi Londini, in the White Bear," and "Apud D^m Sebam vidi." *Ostracion trigonus* he saw "Apud Sir Hans Sloane et in Naggshead"; *Ostracion triqueter* and *O. quadricornis*, "Londini in the Naggshead et apud Mr. Lillia."

The specimens were all said to have come from India.

OSTRACION TRIGONUS, Linn.

Ostracion trigonus, LINNÆUS, Syst. Nat. ed. x, 1758, i, p. 330, No. 2: ed. xii, 1766, i, p. 408.—BLOCH, Ichthyologie, iv, 1787, p. 115, pl. cxxxv (*coffre à perles*).—GMELIN, Linn. Syst. Nat. 1788, i, p. 1441 (assigning erroneously 14 rays to first dorsal).—LACÉPÈDE, Hist. Nat. Poiss., etc. i, 1798, pp. 465–466; ed. ii, 1819, p. 842.—SCHNEIDER, Bloch Syst. Ichth. 1801, p. 499 (erroneously described with orbital spines).—SHAW, Gen. Zool. v, 1804, p. 422.—CUVIER, Règne Anim. ed. 1, 1817, p. 154: ed. ii, 1829, p. 375, note.—KAUP, Arch. für Naturg. 1855, p. 218 (a quoted name: Kaup did not profess to have examples).—HOLLARD, Ann. Sci. Nat. vii, 1856, p. 150.—GÜNTHER, Cat. Fish Brit. Mus. viii, 1870, p. 256.

Ostracion trigonum, POEY, Mem. sob. Hist. Nat. Cuba, ii, 1861, p. 362.

Lactophrys trigonus, SWAINSON, Nat. Hist. Fish, Rept. and Amphib. 1839, ii, p. 324, fig. 102.—POEY, Enum. Pisc. Cubens. 1876, p. 174.

Ostracion Yalei, STORER, Bost. Journ. Nat. Hist. i, 1837, p. 353, pl. viii.

Lactophrys Yalei, DEKAY, Zool. N. Y. Fishes, 1842, p. 362.—STORER, Mem. Am. Acad. Sci. viii, 1861, p. 429, pl. xxxv, fig. 3; Hist. Fish Mass. 1867, p. 429, pl. xxv, fig. 3.

Lactophrys oviceps, KAUP, l. c.

Ostracion (Lactophrys) undulatus, POEY, Rep. Fis. Nat. Cuba, ii, 1868, p. 441 (a specific name founded solely on color).

Lactophrys undulatus, POEY, Enum. Pisc. Cubens. 1876, p. 176.

Ostracion expansum, COPE, Trans. Amer. Phil. Soc. 1870, p. 474, figs. 9, 10.

Piscis triangularis clusii, cornibus carens, LISTER, in App. Willughby, Hist. Pisc. 1686, p. 156.—RAY, Syn. Method. Pisc. 1713, p. 44.

Ostracion triangulatus, limbis figurarum hexagonarum eminentibus, aculeis duobus in imo ventre, ARTEDI, Gen. Pisc. 1738, p. 56, No. 7.

Ostracion triangulatus, limbis figurarum hexagonarum eminentibus, aculeis duobus in imo ventre, ARTEDI, Syn. Pisc. 1738, p. 85, No. 11.

Ostracion polyodon tetragonus, abdomine pone bicorni, LINNÆUS, Iter Scand. p. 160.

Species dubia an Lactophrys trigonus? POEY, Rep. Fis. Nat. Cuba, ii, 1868, p. 441.

Chapin, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, 1787, p. 31, pl. xvii, fig. i, vide POEY, Proc. Acad. Nat. Sci. Phila. 1863, p. 183.

L'Ostracion triangulo-tuberculé, BONNATERRE, Encyc. Method. 1788, p. 21, pl. xiii. Chapin, Cuba. Trunk-fish, Jamaica.

DISTRIBUTION.

St. Croix (Günther).

Jamaica (Günther).

Bermuda (Goode).

Cuba (Poey, National Museum).

Holmes Hole, Mass. (Storer).

Chesapeake Bay, October, 1877 (Lugger).

Barbados (Schomburgk).

St. Martins (Cope).

Tortugas (National Museum).

Bahia (Günther).

Bahamas (National Museum).

Ostracions, with triangular carapace, provided with a flat, conspicuous spine on each abdominal ridge, which is itself sharp and prominent.

Hollard claims that *Ostracion trigonus* is one of the largest, if not the largest, as was claimed by Artedi,* of the triangular species, and gives the following measurements of one of the specimens studied by him :

	M.
Total length	0.460
Greatest height.....	0.150
Greatest width (in abdominal region).....	0.135
Length of cephalic region	0.180
Length of tail-stem	0.100
Caudal	0.060
Largest diameter of lateral scutes.....	0.028

The largest specimen obtained by me in the Bermudas did not exceed 350 millimetres in length.

Linnaeus in his *Systema Naturæ*, edition tenth, attributed to this species fourteen dorsal rays, an error which, as Hollard has pointed out, has been copied and recopied by ichthyological writers down to the present day.

Kaup (l. c.) described the species anew under the name *Ostracion oviceps*. He appears not to have recognized any of the specimens studied by him as belonging to *O. trigonus*, the characters of which were totally misapprehended by him. His description of *O. oviceps* corresponds to the characters of *O. trigonus*,† while the radial formulæ, the only characters given by him for *O. trigonus*, are imaginary and do not apply to any fish known to exist. The formula for the dorsal perpetuates the Linnaean error already referred to; that for the caudal was probably made out from mutilated specimens. Hollard, who worked over the collections in the Paris Museum the year subsequent to the publication of Kaup's Memoir, states that he found certain specimens of *O. trigonus* which had been labeled with the name *O. oviceps* by Dr. Kaup, while others precisely like them had been left with the identification *O. trigonus*. This signifies little, however, for no good characters have ever been given for the proposed new species.

The color of living individuals of *Ostracion trigonus* is a uniform brown, with numerous irregularly grouped whitish spots, more abundant on the caudal stem than elsewhere. The fins are lighter than the body. Young specimens have a subcircular blackish blotch upon the side behind the gill-opening.

This species probably breeds in the Bermudas. I obtained three specimens ranging in length from 1 inch to 12 inches, though I was not so fortunate as to secure young of any other species of the genus.

* "Maximus est ex triangulatis," ARTEDI, Gen. Pisc. p. 57.

† Profil des Kopfes convex und plötzlich herabsteigend. Der lange Schwanz blaugefleckt oder einfarbig mit einem Hornschild auf der Wurzel nächst dem Panzer. Der Rücken hinter den erhöhten Augenkreisen begumend- Schwanzflosse gegabelt:

Trigonus, P. 10, D. 14, A. 9, C. 7.

Oviceps, P. 12, D. 10, A. 10, C. 10. Kaup, l. c.

Lacépède and Hollard speak of the power of making audible sounds attributed to this species by travellers, and which had gained for it the name *cochon de mer*. I have never had one of them in captivity, but have often observed the same habit in *Ostracion triqueter*, which utters frequent and audible grunting sounds when taken from the water. These sounds are similar to those made by several members of the family Tetodontidæ, familiar to every collector of fishes on the Atlantic coast of the United States.

OSTRACION QUADRICORNIS, Linnæus.

- Ostracion quadricornis*, LINN. Syst. Nat. ed. x, 1758, i, p. 331; ed. xii, 1766, i, p. 408.—BLOCH, Ausl. Fische Ichth. iv, 1787, p. 113, pl. cxxxiv.—GMELIN, Linn. Syst. Nat. 1788, i, p. 1442.—LACÉPÈDE, op. cit. i, 1798, pp. 442, 463; ed. ii, 1819, ii, p. 343, pl. xv, fig. 2.—SCHNEIDER, Bloch Syst. Ichth. 1801, p. 499.—SHAW, Gen. Zool. v, 1804, p. 424.—CUVIER, Règne Animal, ed. i, 1817, p. 154; ed. ii, 1829, p. 375.—KAUP, Arch. für Naturg. xxi, 1855, p. 218.—HOLLARD, Ann. Sci. Nat. 1857, p. 148.—BLEEKER, Poiss. Guinée, 1863, p. 20.—GÜNTHER, Cat. Fish Brit. Mus. viii, 1870, p. 258.
- Ostracion quadricorne*, POEY, Mem. Hist. Nat. Cuba, ii, 1861, p. 362.
- Ostracium quadricorne*, COPE, Trans. Amer. Phil. Soc. 1870, p. 474.—GOODE, Cat. Fish Bermudas, 1876, p. 24; Amer. Journ. Sci. and Arts, 1877, p. 290.
- Ostracion (Acanthostracion) quadricornis*, BLEEKER, Atlas Ichthyologique, 1865, p. 32.
- Ostracion (Acanthostracion) quadricorne*, POEY, Rep. Fis. Nat. Cuba, ii, 1868, p. 439.
- Acanthostracion quadricorne*, POEY, Enum. Pisc. Cubensis, 1876, p. 174.
- Lactophrys quadricornis*, SWAINSON, Hist. Nat. Fish and Rept. 1839, ii, p. 324.
- Ostracion tricornis*, LINN. fide Bleeker, Ned. Tyds. Dierk. ii, p. 298.—LACÉPÈDE, op. cit. i, 1798, p. 465; ed. ii, 1819, ii, p. 342, pl. xv, fig. 1.
- Ostracion Listeri*, LACÉPÈDE, Hist. Nat. Poiss. i, 1798, p. 468, pl. xxiii, fig. 2 ("cop. Willughby") ed. ii, 1819, ii, p. 343.
- Ostracion sex-cornutus*, MITCHILL, Amer. Month. Mag. ii, 1818, p. 328 (desc. of spec. from Gulf of Mexico near mouth of Mississippi River).
- Lactophrys sex-cornutus*, STORER, Mem. Amer. Acad. ii, p. 498; Syn. 1846, p. 246.
- Ostracion cornutus* (not Bl. or Linn.), MÜLL. and TROSCHE, in Schomburgk, Hist. Barbados, 1848, p. 677.
- Ostracion guineensis*, BLEEKER, Ned. Tyds. Dierk. ii, p. 298 (on young individual).
- Ostracion Gronovii*, BLEEKER, l. c.
- Ostracion maculatus*, HOLLARD, op. cit. p. 149.
- Species dubia an Acanthostracion maculatum*, POEY, Rep. Fis. Nat. Cuba, ii, 1868, p. 439.
- Species dubia an Acanth. quadricorne mas*, POEY, Rep. Fis. Nat. Cuba, ii, p. 439.
- Acanthostracion polygonius*, POEY, Enum. Pisc. Cubens. 1876, p. 175.
- Quamajacee apé*, MARCGRAVE, Hist. de Brasil, 1648, iv, p. 142 (fide CASTELNAU, l. c. p. 99).
- "*Guamaiacu*", JONSTON, Pisc. tab. xxxvi, fig. 3, tab. xlv, sup. fig. 6," fide Bleeker.
- "*Piscis triangularis cornutus clusii*", WILLUGHBY, Hist. Pisc. 1686, xiv, tab. J."
- Piscis triangulus clusii cornutus*, RAY, Syn. Method. Pisc. 1713, p. 44.
- Ostracion triangulatus 2 aculeis in fronte et totidem in imo ventre*, ARTEDI, Syn. Pisc. 1738, p. 85, No. 9; Genera Piscium, 1738, p. 56, No. 5.
- Toro, PARRA, Desc. Dif. Piez. Hist. Nat. Cuba, ii, 1787, p. 81, pl. xvii, fig. 2.
- Piscis triangularis capite cornutus cui e media cauda cutacea aculeus longus erigitus*, LISTER, in App. Willughby, op. cit. p. 19.—RAY, l. c.
- Ostracion triangulatus, aculeis duobus in capite et unico longiore superne ad caudam*, ARTEDI, l. c. No. 10, Gen. Pisc. p. 56, No. 6.
- "*Piscis triangularis marince cornutus squamis hexagonis et radiatis donatus*", LISTER, l. c. p. 15," fide Bleeker.

- Crayracion triangularis duobus cornibus curtis in fronte, etc.* KLEIN, Misc. iii, p. 21.
Coffre triangulaire à quatre épines, BONNATERRE, p. 21, pl. xiii, fig. 43.
Toro, Cuba (Anglice "Bull").
Cow-fish, Bermudas.
Cuckold, Jamaica.
Cuckold-fish, BLOCH, Ausl. Fische, p. 21, pl. xiii, fig. 43.

DISTRIBUTION.

St. Croix (Cope).	Tortugas (National Museum).
St. Martins (Cope).	Cape Florida (National Museum).
Bahamas (Cope).	Charlotte Harbor (National Museum).
Barbados (Schomburgk).	Pensacola (National Museum).
Jamaica (Günther, National Museum).	Mississippi (National Museum).
Santo Domingo (Günther).	South Carolina (National Museum).
Bahia (Günther, Castelnau).	West Africa (Bleeker).
Cuba (Poey, National Museum).	Indian Archipelago (Bleeker).
Near mouth of Miss. R. (Mitchill, 1818).	Cape of Good Hope (Bleeker).
Chesapeake Bay (Lugger).	

Ostracions, with triangular carapace approaching to pentagonal form in adults, to tetragonal in young, by reason of extension of base of frontal spines, ventral surface plane, angles obtusely carinate, and with two ventral and two horizontal frontal spines. Color brown, yellow, blue or green, the centres of the scutes often lighter than the margins.

The range of the Cow-fish is much more extended than that of any of the preceding species, including St. Helena, Guinea, the Cape of Good Hope, and Charleston, S. C. A specimen was obtained October 11, 1877, near Gwyn's Island, Chesapeake Bay, by Mr. Otto Lugger. These localities are well authenticated, and the species is also claimed as a member of the fauna of the Indian Ocean. A sketch of *Ostracion quadricorne* by Burkhardt, marked "Mobile, 1853," is in the Agassiz collection. The sketch is also endorsed with a memorandum to the effect that a specimen from Florida was living in Aquarial Garden, Boston, 1860.

Bleeker admits this species to the fauna of the Dutch East Indies, but states expressly that he has never found it, and that he follows the authority of Bennett and Raffles, and that it is uncertain whether it really inhabits the Indian Archipelago.

I have never seen more than one species of this type, and the synonymy at the head of this notice expresses the views of the majority of ichthyologists as well as my own. It seems only fair, however, to quote the opinion of Dr. Bleeker. "It appears to me very evident," wrote he, "that there are at least five species of triangular (or rather pentagonal) *Ostracions* with frontal and preanal spines. Of these this (*O. quadricornis*) is the one longest known, and may be easily distinguished by the nearly vertical profile of the head as well as by the strong spine which terminates the postero-superior dorsal plate. The other species resembling *quadricornis* are *Ostracion notacanthus*, Bleeker, *Ostracion tricornis*, L. (= *Ostracion maculatus*, Holland), *Ostracion Gronovii*, Bleeker, and *Ostracion guineensis*, Bleeker, but none of these exhibits the remarkable character of the postero-superior dorsal angle developed into a spine. *Ostracion notacanthus* is characterized by the presence of a

spine upon the dorsal crest, by its oblique profile, and by the hexagonal or irregular black ring with large yellowish centre which is plainly visible upon each plate of the back and the flanks; while *Ostracion Gronovii* is easily recognized by the greater length of the frontal and preanal spines, by the absence of the median dorsal spine, and by the very oblique profile of the snout. *Ostracion tricornis*, Linn., which appears to be identical with the species described by Hollard as *Ostracion maculatus*, is marked by its nearly vertical profile and by longitudinal brown bands upon the cheeks. *Ostracion guineensis* is marked by the subvertical profile of *O. tricornis*, but has cheeks without bands, and the plates of the carapace ornamented with a central ocella of pearl color or blue."

The largest specimens, or the two types *O. quadricornis* and "*O. maculatus*," in the Paris Museum, had, according to Hollard, the following dimensions:

	<i>O. quadricornis.</i>	<i>O. maculatus.</i>
	M.	M.
Total length	0.400	0.390
Height.....	0.150*	0.120
Cephalic region.....	0.065	0.050
Tail-stem	0.060	0.080
Caudal	0.080	0.080
Abdominal width.....	0.090	

The presence of plates upon the caudal peduncle is apparently accidental. They may possibly have some relation to sex, but certainly none to age. Out of fourteen specimens examined five had plates above and below, one had two above, and six had none. In none of the specimens can I distinguish traces of the spine in the middle of the dorsal ridge mentioned by Dr. Günther. The color of young specimens is well described by Günther; the bands on the cheek are, however, of a bright blue. Adult specimens are colored in a rich bright blue or green, lighter in the centre of each hexagonal plate, giving the appearance of annular markings, which quickly vanishes after death. In some individuals the color is worn from the ridges of the carapace, leaving patches of light brown. Bleeker claimed for his species *Ostracion notacanthus* a peculiar system of coloration, but it is in nowise different from that of the ordinary type of *O. quadricornis*.† The largest specimens are 21 inches long.

In the Bermudas the Cow-fish is, I was told, much esteemed for food, and is frequently baked whole in its shell. The popular name, like the Cuban "*toro*" and the Jamaican "cuckold," refers to the two horn-like supraorbital spines.

* Misprinted 0.015.

† "Mais en outre le système de coloration de l'espèce que je crois nouvelle est très différent, chaque bouclier de la tête, du dos et des flancs étant orné d'un anneau violet ou noirâtre d'une forme hexagone, pentagone, quadrangulaire ou même ronde, et à centre large orange ou rougeâtre. On ne voit rien de pareil sur le corps du *quadricornis*. Puis encore, la queue est brunâtre et a taches jaunâtres et les pectorales ont un rayon de plus. Je nomme cette espèce nouvelle *Ostracion notacanthus*."—Mémoire sur les Poissons de la Côte de Guinée par P. Bleeker, p. 21.

OSTRACION QUADRICORNIS, LINN., SUBSP. NOTACANTHUS, (BLEEKER.)

Ostracion notacanthus, BLEEKER, Poiss. Guinée, 1863, p. 21 (St. Helena); Ned. Tyds. Dierk., ii, p. 298, et alibi.

This form, whose relations to *O. quadricornis* are discussed above, p. 267, p. 270, and p. 280, is recorded only from St. Helena. It will only be entitled to subspecific rank if in future it be shown that the dorsal median spine, sometimes observed in the young, remains persistent in the adult.

OSTRACION TURRITUS, Forskaol.

? *Ostracion gibbosus*, LINNÆUS, Syst. Nat. ed. x, 1758, p. 331; ed. xii, 1766, p. 409. (No description.)

Ostracion turritus, FORSKÅL, Desc. Anim. Av. Amphib. Piscium. cet. quae in itinere Orientali observavit, 1775, p. 75, No. 113.—BLOCH, "Ausl. Fische i, p. 113, pl. cxxxvi."—ICHTH., p. 117, pl. cxxxvi.—GMELIN, Linn. Syst. Nat. 1788, p. 1442.—WALBAUM, Artedi, Gen. Pisc. 1792, p. 476.—LACÉPÈDE, Hist. Nat. Poiss. ed. i, 1, 1798, p. 470.—SCHNEIDER, Bloch Syst. Ichth. 1801, p. 500.—BONNATERRE, Encyc. Method. Ichth., 1788, p. 22.—CUVIER, Règne Anim. ed. i, 1817, ii, p. 154, note; ed. ii, 1829, ii, p. 376, note; "ed. iii, Poiss. p. 346."—RUPPELL, "Reis. F. R. M. p. 5."—SWAINSON, Nat. Hist. Fish. Amphib. Rept. 1839, ii, p. 323.—HOLLARD, Ann. Sci. Nat. vii, 1856, p. 156.—BLEEKER, "V. Bat. Gen. xxiv, Bal. Ostr. p. 31; Act. Soc. Sc. Ind. N. vii, Zesde bijds. vischf. Jap. p. 13."

Ostracion (Tetrosomus) turritus, BLEEKER, Atl. Ichth. v, 1865, p. 31, pl. cciii, fig. 3.

Lactophrys camelinus, DEKAY, Zool. N. Y. Fish, 1842, p. 341, p. lviii, fig. 190.

Ostracion gibbosus, KAUP, Arch. für Naturg. Berlin, 1855, p. 218.—GÜNTHER, Cat. Fish Brit. Mus. viii, 1870, p. 258.

"*Ostracion prior* (or *alter*), ALDROVANDUS, De Piscibus, etc. (1638), iv, p. 561" ("copied by JONSTON, tab. xxv, fig. 6").

"*Ostracion alter gibbosus*, RAY, Synopsis, 1713, p. 44."

Ostracion alter gibbosus aldrovandi, WILLUGHBY, Hist. Pisc. 1686, tab. J, 9, fig. 1.

"*Crayracion triangularis gibbosus*, KLEIN, Miss. Pisc. iii, p. 20, No. 17."

Ostracion oblongo-quadrangulus gibbosus, ARTEDI, Gen. Pisc. 1738, p. 55.

Ostracion oblongus quadrangulus gibbosus, ARTEDI, Syn. Pisc. 1738, p. 83.

L'Ostracion dromadaire, LACÉPÈDE, op. cit.; ed. ii, 1819, p. 344.

DISTRIBUTION.

Indian Ocean and Archipelago (Günther).

I cannot follow Dr. Günther in accepting for this species the Linnæan name *Ostracion gibbosus*, since no description of this species was published by Linnæus. The first intelligible description was that by Forskaol, and although the indirect references to the figures published by Johnston, Willughby, and others, render it probable that this was the fish referred to by Linnæus, still there is no way of definitely ascertaining the meaning.

"Je crois reconnaître," wrote Bleeker,* "l'espèce actuelle dans les figures citées de Jonston, de Willughby, de Valentyn et de Renard. Celles de Jonston et de Willughby, copiées sur le même modèle, ne montrent ni l'épine frontale, ni celles de la carène ventrale, mais la grande épine dorsale y est assez bien rendus. Celles de Valentyn et de Renard, quoique grossières, ne laissent aucun doute par rapport à

* Atlas Ichthyologique, v, p. 32.

l'espèce qu'elles doivent représenter. Cependant c'est à Forskaol qu'on en doit la première description tolerable."

The diagnosis of Linnæus in the twelfth edition of the *Systema Naturæ* is as follows:

"(Ostracion) gibbosus, S. *O. tetragonus muticus*, gibbosus.
Art. gen. 55, syn. 83. *Ostracion quadrangulus*, gibbosus.
Habitat in Africa.
Varietatem speciei 1 credit Gronovius."

This species surely has no just claim to a place in the fauna of the United States.

De Kay inserted it in his work on the fishes of New York on very slight evidence. I quote the paragraph relating to the single specimen on which he based his description and figure:

"I know nothing of the origin of this species, except that it is said to have been taken on the shore of Long Island. It is possibly the species named *triqueter* by Dr. Smith, and which he represents as 'inhabiting the vicinity of Long Island, New York, but rarely makes its appearance so far to the north as Massachusetts, unless driven on shore by the violence of storms.' The *triqueter* of Artedi, however, has no spines. It bears a considerable resemblance to the *O. turritus* of Forskaol, from the Red Sea; but that species is quadrangular." *op. cit.* p. 342.

There can be little doubt that the fish in De Kay's possession was a dried specimen of *O. turritus*, probably from a Chinese insect box.

Dr. Günther remarks that this species is "very closely allied to and probably identical with *O. gibbosus*" (viii, p. 259), but in his diagnosis he does not refer to any specimens intermediate in form between the two typical forms.

OSTRACION ARCUS, Schneider.

Ostracion arcus, SCHNEIDER, Bloch Syst. Ichth. 1801, p. 502 (citing Seba's figure).

Ostracion (Acanthostracion) arcus, BLEEKER, Atlas Ichthyologique, v, 1865, pp. 35-36, tab. ccii, fig. 3 (adult); cciv, fig. 4 (young), et alibi.

Ostracion cornutus, BLOCH (nec Linnæus), Ausl. Fische, i, p. 105, pl. cxxxix.—BONNATERRE, Tabl. Encyclop. et Method. etc. Ichth. 1788, p. 22, pl. xiv, fig. 44.—LACÉPÈDE, Hist. Nat. Poiss. i, 1798, p. 470.—SCHNEIDER, l. c. p. 500 (?).—SHAW, Gen. Zool. v, 1803, p. 223, pl. clxx.—CUVIER, Règne Anim. 1 ed. 1817, ii, p. 154; 2d ed. 1829, p. 376, note; "3d ed. Poiss. p. 346."—"BENNETT, Life of Raffles, 1830, p. 693."—RICHARDSON, Rep. 15th Meeting Brit. Assoc.; Rep. Ichth. China and Japan, 1846, p. 200.

DISTRIBUTION.

Indian Ocean and Archipelago (Günther).
 Micronesia (Günther).

Professor Gill, in his unpublished Bibliography of the Fishes of the West Coast of North America (p. 17), remarks that "a young specimen

(3½ inches long) of this species, dried, was sent (to him for identification) by Dr. Cooper, in behalf of the Geological Survey of the State of California, as having been given to them with the information that it had been obtained in the State." He notes that the appearance of the specimen led him to believe that it came from China, and in this opinion I would fully coincide, having carefully examined it. The species is provisionally included in this list. At some future time individuals may stray into our Pacific waters.

NOVEMBER 11, 1879.

ON THE HABITS OF THE ROCKY MOUNTAIN GOAT.

By DR. JAMES C. MERRILL, U. S. A.

FORT SHAW, MONTANA, *October 21, 1879.*

Professor S. F. BAIRD,

MY DEAR SIR: Since I last wrote to you I have passed two months at Fort Missoula, on the eastern limit of the Bitter-Root Range, and while there, finding that the wild goat was comparatively abundant, I made several attempts to obtain a skin and skeleton for the Smithsonian. I hunted them myself for two weeks, but unsuccessfully, only seeing one, and that I did not obtain. At that season they are in the highest and roughest peaks near and among snow, but in the winter come down to the lower slopes and valleys.

You may be interested in the following items concerning this species, which I obtained from trustworthy sources:

Accounts vary as to the *rutting* season and time of dropping the kids, but agree in the latter being two in number. During the summer the male, female, and kids keep together and until the appearance of the next young, though during the winter two or three of these families unite. At this season it is unusual to see more than a dozen together, though large bands are said to have been seen. The goats in all their movements are heavy and slow. They are most successfully hunted with dogs; when started by them they generally climb up the nearest rock and stand them off; and while so doing are easily approached and shot. When wounded and in close quarters they are rather dangerous, and are apt to use their horns with effect. They feed at sunrise and sunset, passing the day on some smooth flat rock in the sun, from which they can keep a good lookout, but rarely start until closely approached. The one I saw was among large masses of rock above snow-line. He got up within thirty yards of me, stood in full view for a moment, and then walked slowly off, almost hidden by the rocks. At first, though so near, I took him for an albino bear (and several old hunters told me they had made the same mistake!!); his large size, slow, heavy movements, and manner of looking back over the shoulder, with the absence of fear, being very different from my preconceived notions of the "white

goat." I very soon saw my error, but not liking to risk a snap shot, tried to head the animal off, but without success. The tracks are enormous for the size of the animal. I found many of their dusting places. The earth is pawed up until quite a depression is formed, in which they roll and lie by the hour. They are somewhat like those of the bighorn, but the numerous very long white hairs left in the dust show the presence of the goat. I spoke to my guide (Charles McWhirk, Corvallis, near Missoula, Montana,) about getting some skins and skeletons this winter, and he said he would do so if any one "made it worth his while." If you desire them I think you had better write to him personally about it. I tried to explain to him how the skins should be prepared. According to the recent order of the War Department he can turn them over to the quartermaster at Fort Missoula, forty-five miles distant, for shipment to the National Museum.

This account is not so complete as I could wish, but I send it as better than none, as the goat is so little known. What I have written applies to their habits in the Bitter-Root Range. They are also found rather plentifully in the main range of the Rockies near Flathead Lake. Several have been caught alive, and the Indians sometimes bring in the kids, but the latter soon die.

Nothing of special ornithological interest here now, but the winter fauna in this latitude will be worthy of study.

Very truly, yours,

JAMES C. MERRILL.

NOTES ON A COLLECTION OF FISHES FROM EASTERN GEORGIA.

By TARLETON H. BEAN.

The United States National Museum received, December 15, 1879, from Mr. A. Graves, postmaster at McBean, Ga., five species of fresh-water fishes, one of which is here described as new to science. Mr. Graves writes that the fishes were collected in McBean Creek, which "is the dividing line between Burke and Richmond Counties, and is within two hundred yards of McBean Station, on Augusta and Savannah Railroad. It empties into the Savannah River, about seven miles from this station." The local names are those transmitted by Mr. Graves. The species of *Centrarchidae* have all been previously recorded by Prof. D. S. Jordan, from Georgia.

1. *Chænobryttus gulosus* (C. & V.) Gill.—"Warm Mouth Perch"; "Yaw Mouth Perch".

23509 *a.* D. IX, 11; A. III, 9.

23509 *b.* D. X, 10; A. III, 9.

The first ventral ray, the tips of the anal, caudal, and dorsal rays, and of the membranes between the dorsal spines are crimson. Speci-

men 23509 *a* has a crimson spot half as long as the eye on the sheath under the last four dorsal rays. The pectorals of both examples are yellow.

2. *Xystroplites heros* (B. & G.) Jor.—“Bream”.

23510 *a*. D. X, 10; A. III, 10. (Soft dorsal injured.)

23510 *b*. D. X, 12; A. III, 11.

23510 *c*. D. X, 12; A. III, 12.

23510 *d*. D. X, 12; A. III, 12.

These agree with the types of *Pomotis heros* B. & G.

3. *Xenotis sanguinolentus* (Ag.) Jor.—“Red-belly Perch”.

23511 *a*. D. X, 11; A. III, 10.

23511 *b*. D. X, 11; A. III, 10.

23511 *c*. D. X, 12; A. III, 11.

23511 *d*. D. X, 11; A. III, 10.

The throat, the breast, and the belly are orange red; the soft dorsal and the anal have a narrow margin of the same color; the external caudal rays are tipped with the same. The pectorals are yellow. The sides are indistinctly banded with black.

4. *Esox americanus* Gmel.—“Pike”.

23512. B. XII; D. III, 12; A. IV, 10.

Length, $7\frac{3}{10}$ inches (186 millimeters).

All the fins are yellow. The skin covering the dorsal and caudal rays, however, is blackish.

5. *Hudsonius euryopa* sp. nov.

Teeth 1, 4–4, 1, with a narrow grinding surface on the first two of the long series.

23513 *a*. D. III, 7; A. II, 7; V. I, 7; P. I, 13; C. +, 19, +; L. lat. 38; L. trans. 6 + 5.

23513 *b*. D. III, 7; A. II, 6; V. I, 7; P. I, 13; C. +, 19, +; L. lat. 38; L. trans. 6 + 5.

The greatest height of the body equals the length of the longest dorsal ray; it is slightly less than the length of the head, and is contained in the length of body, without caudal, 5 times. The length of the head is contained 4 to $4\frac{1}{2}$ times in the same. In specimen 23513 *a* the length of the pectoral equals the greatest height of the body; in specimen 23513 *b* it equals the length of the head without the snout. The long diameter of the eye equals $\frac{1}{3}$ of the length of the head. The length of the ventral is contained 6 to $6\frac{1}{2}$ times in length of body without caudal. The distance of the origin of the dorsal from the snout equals twice the length of the head, and equals the distance of the ventral from the snout. The longest anal ray equals in length the longest ventral ray. The length of the anal basis equals $\frac{1}{2}$ the greatest height of the body. The length of the upper jaw equals the short

diameter of the eye. The length of the lower jaw and that of the post-orbital portion of the head are equal. There is a black lateral band following the course of the lateral line and continued around the nose, most distinct in the young specimen.

UNITED STATES NATIONAL MUSEUM,
Washington, December 18, 1879.

**DESCRIPTION OF A NEW SPECIES OF AMIURUS (A. PONDEROSUS)
FROM THE MISSISSIPPI RIVER.**

By TARLETON H. BEAN.

The United States National Museum received from Dr. J. G. W. Steedman, of Saint Louis, Mo., chairman of the Missouri Fish Commission, on the 8th of November, 1879, a Catfish which weighed 150 pounds at the time of shipment. After comparing this with the other described species of *Amiurus* I am unable to identify it with any of them. The most distinguishing character of the species is its many-rayed anal, in which it resembles *Ichthæurus* rather than *Amiurus*, though it has the skull-structure of the latter.

The specimen which forms the type of the present description was sent at the request of Prof. Spencer F. Baird, United States Commissioner of Fish and Fisheries, to whom Dr. Steedman wrote the following information: "Your letter requesting the shipment to you of a large Mississippi Catfish was received this morning. Upon visiting our market this P. M. I luckily found two—one of 144 lbs., the other 150 lbs. The latter I ship to you to-night by express. . . . I purchased it from an old fish-dealer of 30 years' experience in our market; and he assures me that the largest Mississippi Catfish he has met in that time weighed 198 pounds. (He says he has *heard* of Catfish weighing 250 and 300 pounds, but he does not believe the stories.) This is the only variety, he says, which reaches 100 lbs. There is another species which sometimes attains 65 lbs. in weight. My informant (and he is *practical* authority among us) enumerates six well-marked varieties of Catfish in the Mississippi waters. . . ."

The admission of this species into the genus *Amiurus* will necessitate a modification of the definition of the genus so far as the limits of variation in the anal rays are concerned; and will leave only the lack of contiguity between the supra-occipital and the second interspinal to distinguish *Amiurus* from *Ichthæurus*. A plaster cast and the skeleton of the type are preserved.

DESCRIPTION.—The catalogue number of the type is 23388; its length, to the origin of the middle caudal rays, is 57.2 inches, to the end of the same rays, 61 inches. The distance from the middle of the base of the caudal to the end of the upper caudal lobe is 8 inches.

The shape of the body resembles that of *A. nigricans*; the caudal, however, is emarginate and not deeply forked as in that species.

In the description and table of measurements the length of body is to be understood to mean the length to the origin of the middle caudal rays—57.2 inches.

The greatest height of the body (.29) is contained $3\frac{1}{2}$ times in its length, and equals twice the length of the external caudal rays (.14). Its greatest width (.18) is contained $5\frac{1}{2}$ times in length of body, and equals $\frac{2}{3}$ of the length of the head (.27). The height of the body at the ventrals (.29) equals the greatest height. The least height of the tail (.084) equals the length of the snout (.084), which is contained $3\frac{1}{4}$ times in the length of the head. The length of the caudal peduncle (.16) equals twice its least height.

The length of the head (.27) is contained $2\frac{3}{8}$ times in length of body, and equals 3 times that of the ventral (.09). The width of the mouth (.168) equals twice the length of the snout (.084), and is contained 6 times in length of body. The extent of the intermaxillary band of teeth (.106) nearly equals the distance from the snout to the orbit (.108). The greatest width of the head (.22) equals $\frac{4}{5}$ of its greatest length. The distance between the eyes (.15) is slightly more than half the length of the head, and equals the length of the mandible (.15). The length of the intermaxillary (.108) equals the distance from the snout to the orbit (.108), and is contained $2\frac{1}{2}$ times in the length of the head. The length of the maxillary barbel of the right side (.16) equals that of the caudal peduncle, and nearly equals the width of the mouth. The remaining barbels except the nasal are too imperfect to admit of description. The distance from the lower nostril to the eye (.06) equals 4 times the long diameter of the eye (.015). The distance from the upper nostril to the eye (.056) is contained slightly more than $4\frac{1}{2}$ times in the length of the head.

The distance of the first dorsal from the snout (.365) is contained $2\frac{3}{4}$ times in length of body, and equals 3 times the length of its first ray (.122). The length of the first dorsal base (.082) nearly equals that of the snout. The length of the dorsal spine (.105) is contained $2\frac{1}{2}$ times in that of the head. The length of the last dorsal ray (.05) equals $\frac{1}{3}$ of the distance between the eyes.

The distance of the adipose dorsal from the snout (.81) equals nearly 3 times the length of the head. Its length of base (.043) is contained 6 times in the distance of the pectoral from the snout (.26). Its greatest height (.06) equals the distance between the lower nostril and the eye (.06), and is contained $4\frac{1}{2}$ times in the length of the head.

The distance of the anal from the snout (.67) is contained $1\frac{1}{2}$ times in length of body, and equals 3 times the greatest width of the head; its distance from the anus (.035) is contained 3 times in the length of the dorsal spine, and 8 times in that of the head. The length of the anal base (.26) equals the distance of the pectoral from the snout (.26), and

is contained $3\frac{4}{5}$ times in length of body. The length of the first anal ray (.01) is contained 8 times in the least height of tail. The ninth and longest anal ray (.077) is nearly as long as the base of the first dorsal (.08). The length of the last anal ray (.033) equals $\frac{1}{2}$ that of the middle caudal rays (.066), which is contained 15 times in the length of body.

The proportion between the middle and external caudal rays (.14) is as $3\frac{4}{5}$ to 8, both being measured from the middle of the origin of the middle caudal rays. The length of the external caudal rays is contained 7 times, and of the middle caudal rays, 15 times in the length of body.

The distance of the pectoral from the snout (.26) is somewhat more than twice the length of the pectoral (.125).

The distance of the ventral from the snout (.56) equals 4 times the length of the external caudal rays. The length of the ventral equals $\frac{1}{3}$ of the length of the head and $\frac{1}{11}$ of the length of body.

Radial formula: B. VIII; D. II, 6; A. III, 32; P. I, 11; V. I, 7.

Color:—Upper part of body and head bluish slate; lower parts whitish.

The length of the ovaries is 17 inches, and the weight 5 pounds avoirdupois. The diameter of the eggs is from $\frac{1}{12}$ to $\frac{1}{10}$ of an inch. They are not readily separable and are apparently far from maturity.

Amiurus ponderosus differs considerably from *A. nigricans* as will be seen in the measurement tables. *A. ponderosus* has (1) a deeper body; (2) a much wider mouth; (3) a wider interorbital space; (4) the intermaxillary and the intermaxillary band of teeth longer; (5) the maxillary barbel only $\frac{2}{3}$ as long as the head instead of $\frac{6}{7}$ as in *nigricans*; (6) the long diameter of the eye contained $17\frac{1}{2}$ times in the length of the head instead of 9 to 11 as in *nigricans*; (7) the first ray of the dorsal less than $\frac{1}{2}$ as long as the head; (8) the longest anal ray less than $\frac{1}{3}$ as long as the head; (9) the caudal rays shorter and the caudal not forked; (10) the pectoral considerably less than $\frac{1}{2}$ as long as the head (more than $\frac{1}{2}$ in *A. nigricans*); (11) the ventral contained 3 times in length of head ($2\frac{1}{4}$ in *A. nigricans*); (12) anal rays, III, 32.

Table of measurements.

 Species: *Amiurus ponderosus*.

Current number of specimen	23388 ♀.		
Locality	Mississippi River, near Saint Louis, Mo.		
	Inches and 10ths.	100ths of length without caudal.	Times in length of body.
Length to origin of middle caudal rays.....	57.2		
Length to end of middle caudal rays.....	61.0		
Body:			
Greatest height	16.7	29.00	3½
Greatest width	10.5	18.00	5½
Height at ventrals.....	16.6	29.00	3½
Least height of tail.....	4.8	8.39	12
Length of caudal peduncle.....	9.3	16.00	6½
Head:			
Greatest length	15.7	27.44	3½
Width of mouth	9.6	16.78	6
Greatest width	12.5	21.85	4½
Width of interorbital area.....	8.6	15.00	6½
Length of snout.....	4.8	8.39	12
Extent of intermaxillary band of teeth	6.1	10.66	9½
Extent of intermaxillaries.....	6.2	10.84	9½
Length of right maxillary barbel.....	9.3	16.00	6½
Length of mandible	8.5	15.00	6½
Distance from lower nostril to eye.....	3.5	6.11	4½ (in head).
Distance from snout to orbit.....	6.2	10.84	9½
Distance from upper nostril to eye	3.2	5.59	4½ (in head).
Diameter of orbit.....	.9	1.57	17½ (in head).
Dorsal (first):			
Distance from snout.....	20.9	36.54	2½
Length of base.....	4.7	8.21	12½
Length of first spine.....	6.0	10.49	9½
Length of first ray.....	7.0	12.23	8
Length of last ray.....	2.8	5.00	20
Dorsal (adipose):			
Length of base.....	2.5	4.37	23
Distance from snout.....	46.4	81.11	14
Greatest height	3.5	6.11	4½ (in head).
Anal:			
Distance from snout.....	38.4	67.00	1½
Distance from anus.....	2.0	3.49	8 (in head).
Length of base.....	15.0	26.22	3½
Length of first ray.....	.6	1.05	26 (in head).
Length of longest ray (9th).....	4.4	7.69	13
Length of last ray.....	1.9	3.32	8½ (in head).
Caudal:			
Length of middle rays.....	3.8	6.64	15
Length of external rays	8.0	14.00	7
Pectoral:			
Distance from snout.....	15.0	26.22	3½
Length.....	7.2	12.58	8
Ventral:			
Distance from snout.....	32.0	56.00	1½
Length.....	5.2	9.09	11
Branchiostegals	VIII		
Dorsal	II, 6		
Anal	III, 32		
Pectoral.....	I, 11		
Ventral.....	I, 7		

Table of measurements.

Species: *Amiurus nigricans*.

Current number of specimen.....	19092. Saint John's River, Florida. G. B. Goode.		20802. (Skin.) Normal, Illi- nois.		11116. (Skin.) Sandusky, Ohio.		11117. (Skin.) Sandusky, Ohio.	
Locality								
	Inches and 10ths.	100ths of length without caudal.	Inches and 10ths.	100ths of length without caudal.	Inches and 10ths.	100ths of length without caudal.	Inches and 10ths.	100ths of length without caudal.
Length to origin of middle caudal rays	18.5							
Length to end of middle caudal rays	20							
Body:								
Greatest height		.25						
Height at ventrals		.24						
Least height of tail		.09						
Length of caudal peduncle		16½						
Head:								
Greatest length		27	7.7		7.3		7.8	
Width of mouth		11½						
Greatest width		20						
Width of interorbital area		12½						
Length of snout		10						
Extent of intermaxillary band of teeth		7½	2.5		2.3		2.5	
Extent of intermaxillaries		8½						
Length of left maxillary barbel		21½						
Length of mandible		14	6.6		6.4		6.3	
Distance from lower nostril to eye		7						
Distance from snout to orbit		11½						
Distance from upper nostril to eye		5						
Diameter of orbit		3	.7		.75		.8	
Dorsal (first):								
Distance from snout		37½						
Length of base		8						
Length of first spine		10½						
Length of first ray		15½	4		4		4	
Length of last ray		6						
Dorsal (adipose):								
Length of base		6½						
Distance from snout		78½						
Greatest height		7½						
Anal:								
Distance from snout		63½						
Distance from anus		4½						
Length of base		20½						
Length of first ray		1½						
Length of longest ray		11½	3.3				3.5	
Length of last ray		4½						
Caudal:								
Length of middle rays		8½						
Length of external rays	3.6	20						
Pectoral:								
Distance from snout		24						
Length		16½	4.1		4.1		4.3	
Ventral:								
Distance from snout		52						
Length		12						
Branchiostegals	VIII							
Dorsal	II, 6		II, 6					
Anal	III, 23		III, 24		III, 23		III, 25	
Pectoral	I, 10		I, 9					
Ventral	I, 7		I, 7					

* Extends beyond end of head.

NOTE ON *ENDOTHYRA ORNATA*.

By C. A. WHITE.

Among the fossils obtained by Prof. O. St. John from the Carboniferous strata of the region of the Téton Mountains, southward from the Yellowstone National Park, are some fragments of a dark silicious limestone, adhering to the weathered surfaces of which are some small globular foraminifera. None of them are in an entirely satisfactory condition of preservation, but their internal structure is very well shown in some cases. Samples of these objects have been submitted to Mr. Henry B. Brady, F. R. S., whose labors with the foraminifera are so well known. He mentions in reply the difficulty of being absolutely sure in the determination of weathered specimens, but still thinks, without any doubt, they are samples of *Endothyra ornata* Brady. (See Brady's Monog. Carb. and Perm. Foram. p. 99, pl. vi, figs. 1-4.) The discovery of this form in that far-western region is interesting since it has hitherto been found only in England, Ireland, and Scotland. Another form of *Endothyra*, however, *E. baileyi* (= *Rotalia baileyi* Hall) is found in the lower Carboniferous strata of Indiana.

NOTE ON *CRIOCARDIUM* AND *ETHMOCARDIUM*.

By C. A. WHITE.

The subgenus *Criocardium* was proposed by Conrad to receive the shells of that section of the genus *Cardium* which bear spines upon the interspaces between the ribs. Besides the type indicated by him (*C. dumosum*) which has "long slender spines between the ribs," there are several European forms which are plainly referable to this section, among which are *C. productum* Sowerby; *C. moutonianum* d'Orb., and *C. carolinum* d'Orb. All these shells have distinct spines or tubercles, or both, occupying all the interspaces between the ribs; those upon the anterior and posterior portions of the valves being longer and more conspicuous than those upon the middle portion.

In adopting this subgenus Mr. Meek (U. S. Geol. Sur. Terr. vol. ix, 4to ser., p. 169) referred to *Criocardium* the *Cardium speciosum* of Meek & Hayden, supposing it to bear spines or tubercles upon its intercostal spaces. In the An. Rep. U. S. Geol. Sur. Terr. for 1877, p. 183, I took occasion to state that among numerous examples of this shell which I had examined, no trace of either spines or nodes was detected, but that in place of them the test was perforated with minute holes. Subsequent examination of portions of the shell of authentic examples, having the natural surface in a better state of preservation than any before examined, shows that these small perforations are perfect apertures through the whole substance of the test, the border of each one being distinctly

defined upon both the inner and outer surface; the margin of the apertures not being even everted or raised upon the outer surface. Moreover, these perforations exist upon the middle portion of the valve only, the greater part of the rows extending from the umbo to the basal border. In the young state, as shown on the umbo of adult shells, a lesser part of the median interspaces were thus perforated, but as the shell grew perforations were introduced into the next outer adjoining interspaces, so that fully one-half of the surface of the adult shell was occupied by them. Both the anterior and posterior portions of the surface, comprising a considerable proportion of the ribs which mark the surface, are entirely without either holes or spines, and besides the ribs, the surface is marked only by the ordinary lines and imbrications of growth.

This shell therefore differs from the typical forms of *Criocardium* in having perforations only instead of spines or nodes upon the intercostal interspaces; and in having neither spines nor perforations upon either the anterior or posterior portions of the valves, upon which portions in *Criocardium* the spines are more conspicuous than upon the median portion. These differences from *Criocardium* are certainly as great as those which separate any of the other recognized subgenera of *Cardium*, and this shell is therefore as worthy as they of subgeneric designation. I therefore propose for a section of the genus *Cardium*, of which *C. speciosum* Meek & Hayden is the type, the subgeneric name of *Ethmocardium*.

WASHINGTON, December 2, 1879.

DESCRIPTIONS OF NEW CRETACEOUS INVERTEBRATE FOSSILS FROM KANSAS AND TEXAS.

By C. A. WHITE.

Of the fossils described in this paper the two Aviculids were discovered by Prof. B. F. Mudge,* in strata of the Dakota Group, in Saline County, Kansas, and sent by him to the National Museum. The locality of these fossils is only about three miles distant from that at which he obtained a series of fossils which were described and figured in vol. ix, U. S. Geol. Surv. Terr. (4to ser.). They are all from the Dakota Group, and all evidently from the same local horizon, because at least two of the associated species are identical with two which were among those described by Mr. Meek, and just referred to.

All the remainder are from Texas, having been sent respectively by Mr. G. W. Marnoch, from Bexar County; Mr. D. H. Walker from Bell County, and Mr. S. W. Black, from Collin County. The types of all these species are now in the collections of the National Museum.

* While these pages are passing through the press the sad intelligence comes that Professor Mudge is dead. He was a sincere devotee and an intelligent interpreter of nature, and, better still, an honest man. Peace to his ashes.—C. A. W.

MOLLUSCA.

Genus *OSTREA* Linnæus.Subgenus *ALECTRYONIA* Fischer.***Ostrea* (*Alectryonia*) *blackii* (sp. nov.).** Plate 4, figs. 1 and 2.

Shell irregularly subovate in marginal outline, moderately capacious, beaks small, sometimes obscure and sometimes moderately prominent. Lower valve usually moderately deep and capacious, its convexity being more prominent about the middle than elsewhere, often subalate, but this latter feature is usually obscure; scar of attachment at the beak usually present and often moderately large; ligament-area usually short and rather small, but sometimes comparatively large and laterally extended; ligament-furrow well defined and having the usual characteristics of the genus. Upper valve nearly flat and corresponding with the lower in other respects, except that it is not so broad along the hinge-border and never has there the subalations which sometimes mark the lower valve. The adductor scars are moderately large and have the form common to *Alectryonia*, namely, curved-spatulate. Surface of both valves marked by concentric lines and strong imbrications of growth, and each by a dozen or more radiating ribs or plications, which constitute a conspicuous feature of the shell; but they are usually somewhat less distinct upon the upper than upon the under valve.

Length, 68 millimeters; greatest breadth, 62 millimeters; thickness, 32 millimeters.

In form and general aspect this shell approaches that of a typical *Ostrea*; but in the character of its adductor scars, the extent of its plications, and the subalation of its cardinal border it is properly referable to *Alectryonia*. The only shell with which it need be compared is *O. bellaplicata* Shumard, also from Texas. It differs from that shell in being constantly larger, proportionally less capacious, broader toward the base, and in having its hinge-border longer and more oblique.

Position and locality.—Cretaceous strata, Collin County, Texas, where it was collected by Mr. S. W. Black, and sent by him to the Smithsonian Institution. The specific name is given in his honor.

Genus *EXOgyra* Say.***Exogyra forniculata* (sp. nov.).** Plate 4, figs. 3 and 4.

Shell subtriangular in lateral outline, somewhat compressed vertically. Under, or left valve thick, especially its umbonal half; beak curved strongly toward the posterior border, and in the plane of the free margins of the valve, not forming so much as one complete revolution, its point being free but closely approaching the posterior border of the valve; ligament-area irregularly triangular, moderately large, extending to the apex of the beak, its sulcus well developed; interior surface

having the usual characteristics of the genus. A faint, illy-defined sulcus is apparent on the posterior side, extending from the umbo to the basal border, between which sulcus and the laterally flattened-concave posterior border of the valve there is an equally undefined radiating curved ridge. The anterior portion of the valve is marked by a strong angular, rough carina or ridge which extends from the beak to the basal border. The prominence of this ridge gives a flattened aspect to the outer surface of the valve, and also produces a flattened space of considerable width between it and the anterior margin. Surface marked by the ordinary coarse lines of growth, often presenting the coarse imbrications so common to the *Ostreidae*; and upon the ridges just described there are occasional nodes or vaulted projections of portions of the shell. Upper valve unknown.

Length, 70 millimeters; breadth across near the base, where it is broadest, 50 millimeters.

In general aspect this shell is much like a *Gryphæa*, but it is referred to *Exogyra* because of its laterally instead of perpendicularly curved umbo and beak. This species therefore affords additional evidence of the well-known fact that the two genera named approach each other very closely. Specifically this shell is well marked by its strong, rough angular carina, its free beak, narrow umbonal region and broad base. In these respects it differs too much from any described form to need detailed comparison. By casual observation it may be mistaken for the variety *navia* Conrad, of *Gryphæa pitcheri*; but a comparison of the beaks of the two forms will show a well-marked difference.

Position and locality.—Cretaceous strata, Bexar County, Texas, where it was collected by G. W. Marnoch, esq., together with many well-known Cretaceous species of that region.

Exogyra winchelli (sp. nov.). Plate 2, figs. 1 and 2; and plate 3, figs. 1 and 2.

Shell of medium size, irregularly subovate in marginal outline; sessile, or attached by a large part of the surface of the lower or left valve, being obliquely inclined so that the anterior border is very much higher than the posterior. Lower valve massive, moderately deep, its front side nearly perpendicular and of considerable height vertically; umbo vertically flattened continuously with the front side, and broadly curving backward; beak closely incurved under the posterior border and there concealed; ligamental groove long and narrow, occupying the whole curvature of the umbo. Upper valve nearly flat, thick; the anterior part being much thicker than the posterior; beak vertically thin or compressed, closely coiled in a plane with that of the valve, making a little more than one entire revolution. Surface marked by coarse lines of growth, and near the anterior borders of both valves, especially the upper, it is usually deeply lacinate.

Length, 90 millimeters; breadth, 66 millimeters; height in front, 55 millimeters.

This species belongs to the same section of the genus *Exogyra* with

E. haliotoidea Sowerby, sp., and *E. walkeri* White. The latter species is larger and proportionally broader than *E. winchelli*, and not properly sessile as the latter species is. *E. haliotoidea*, as figured by d'Orbigny in Pal. Française, t. iii, pl. 478, differs from *E. winchelli* in being proportionately higher in front and narrower in transverse diameter, and in not having the beaks so much incurved. *E. interrupta* Conrad, from Mississippi, also belongs to the same section, but that species is described as having radiating ribs, which ours has not.

Position and locality.—Cretaceous strata, Collin County, Texas, where it was collected and sent to the Smithsonian Institution by Mr. S. W. Black. The collections of the Institution also contain a fine example sent by Prof. A. Winchell many years ago from Prairie Bluffs, Ala., which is believed to be specifically identical with the form here described, but is proportionally more elongate, has a larger muscular scar, and the umbonal curve is a little more abrupt. The specific name is given in honor of Professor Winchell.

Genus GERVILLIA Defrance.

Gervillia mudgeana (sp. nov.). Plate 5, figs. 3 and 4.

This shell is known only by natural casts in brown hematite of the interior, and a few adhering fragments showing the character of the test. It is moderately large, laterally distorted; hinge-line comparatively long, very oblique with the axis of the shell, producing a somewhat prominent posterior alation which is not distinctly defined from the body of the shell; cartilage-pits in the area of each valve six or seven, as indicated by undulations upon the cast; beaks placed very near the anterior end, beyond which there appears to have been no distinct anterior ear; beak of the right valve more prominent than that of the other, although the right valve is less convex transversely than the left; right valve having a somewhat regular and strong longitudinal convexity; but its transverse convexity is very little in the anterior half, while its posterior half is nearly flat; left valve nearly straight, or even slightly concave longitudinally along the axis, but very strongly convex transversely in all parts of the shell, this convexity being more abrupt along the axis than elsewhere; and there is also between the axis and the hinge-margin a slightly raised, rounded fold which extends from behind the beak to the posterior margin; adductor muscular impression large and distinct in each valve. A few fragments show the surface to have been marked by the ordinary concentric lines of growth, and also that the test although firm was not massive.

The dimensions cannot be definitely given, but the largest example discovered indicates a length of at least 80 millimeters.

This shell differs too much from any of the few known Cretaceous species of the genus to need detailed comparison, but it is related to *G. subtortuosa* Meek & Hayden, which it resembles in being tortuous. It differs, however, in being a proportionally much shorter shell, in the

shape and position of the adductor scars, and in the relative position and arrangement of the cartilage-pits. It is less tortuous than *G. tortuosa* Sowerby, and its proportions are different. The relation of this species with *G. subtortuosa* is doubtless genetic, and it presents one more among other now known similar cases of evident genetic relationship between the molluscan fauna of the Dakota Group and that of the later Cretaceous groups of the West, which were formerly unknown, but which the discoveries of Professor Mudge have done more than those of all others to show.

Position and locality.—Strata of the Dakota Group, Saline County, Kansas, where it was discovered by Prof. B. F. Mudge, in whose honor the specific name is given.

Genus PTERIA Scopoli.

Subgenus OXYTOMA Meek.

Pteria (Oxytoma) salinensis (sp. nov.). Plate 5, figs. 1 and 2.

Shell rather large for a Cretaceous *Pteria*; the body, exclusive of the wings, obliquely subovate, broad at the base, moderately gibbous, distinctly but not very greatly inequivalve; the left valve, as usual, more convex than the right and its beak more prominent; the convexity of the valves somewhat uniform but increasing toward the umbonal region in each, where it is greatest; anterior wing moderately large, defined from the body of the shell by being laterally compressed, but not by any distinct auricular furrow; the byssal sinus under the anterior wing of the right valve having the usual size and shape common to *Oxytoma*; posterior wing not proportionally large, and not distinctly defined from the body of the shell except by a somewhat gradual lateral compression; its posterior angle not greatly produced; hinge-line less than the axial length of the shell; posterior adductor scars not distinct; anterior adductor scars distinct and deep for a shell of this genus, placed immediately in front of the beaks, that of the left valve being more distinct than the other.

This, like the last-described species, is known only by natural casts in brown hematite of the interior of the shell, the imperfection of which will not allow of an accurate measurement of all its proportions. It is, however, known to have reached an axial length of more than 60 millimeters, a transverse width near its base of at least 50 millimeters, and a thickness of about 25 millimeters when both valves were in natural position.

The character of the surface is not known, but it was evidently nearly smooth, as is usual with *Oxytoma*. It is related probably genetically to *P. (O.) nebrascana* Evans & Shumard, but it is a larger and more robust shell, with a proportionally larger anterior wing, more prominent beaks, and broader base.

Position and locality.—Strata of the Dakota Group, Saline County,

EXPLANATION OF PLATE 2.

EXOGYRA WINCHELLI.

Fig. 1, interior view of lower valve, natural size. Fig. 2, inside view of upper valve. (See other figures on Plate 3.)

EXPLANATION OF PLATE 3.

EXOGYRA WINCHELLI.

Fig. 1, front view of lower valve, natural size. Fig. 2, outside view of upper valve. (See other figures on Plate 2.)

EXPLANATION OF PLATE 4.

OSTREA BLACKII.

Fig. 1, outside view of lower valve, natural size. Fig. 2, upper view of the same example.

EXOGYRA FORNICULATA.

Fig. 3, outside view of lower valve, natural size. Fig. 4, inside view of the same.

EXPLANATION OF PLATE 5.

PTERIA SALINENSIS.

Fig. 1, left side view of natural cast of the interior, natural size. Fig. 2, dorsal view of the same.

GERVILLIA MUDGEANA.

Fig. 3, left side view of natural cast of the interior, natural size. Fig. 4, dorsal view of the same.

EXPLANATION OF PLATE 6.

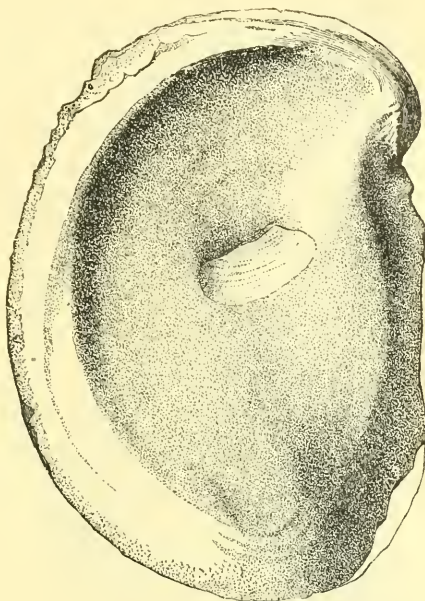
THRACIA MYÆFORMIS.

Fig. 1, right side view, natural size. Fig. 2, dorsal view of the same.

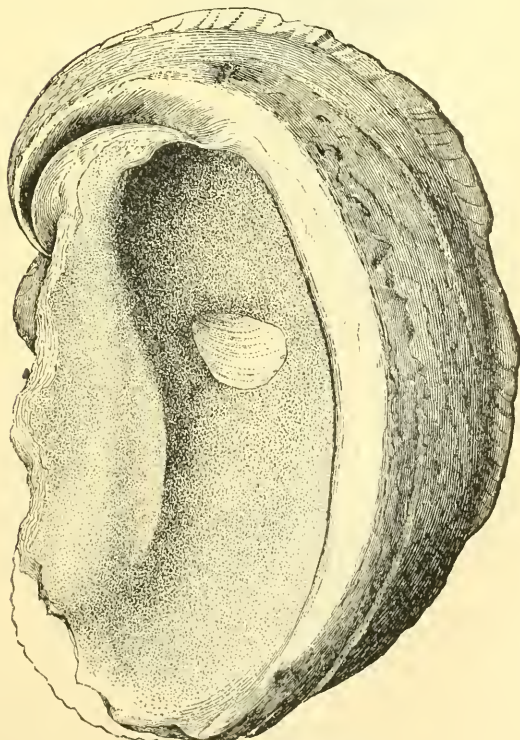
PACHYMYA? COMPACTA.

Fig. 3, right side view, natural size. Fig. 4, dorsal view of the same.

2



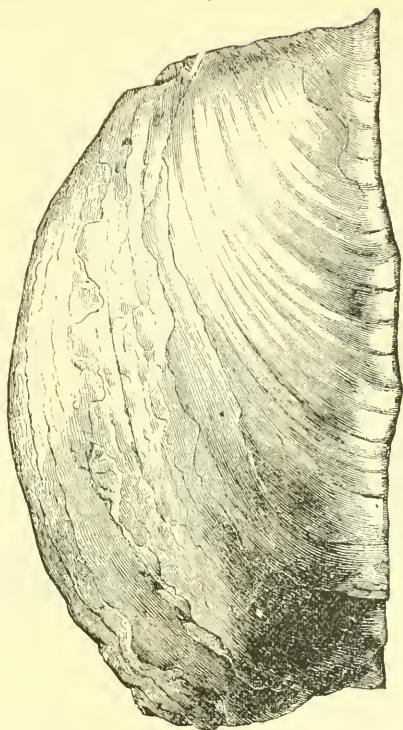
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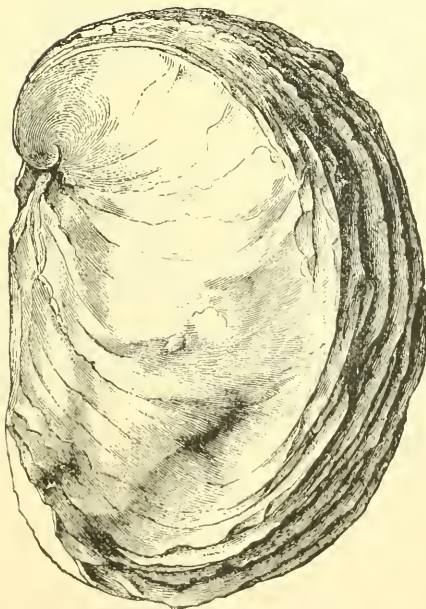
EXOGYRA WINCHELLI.



1

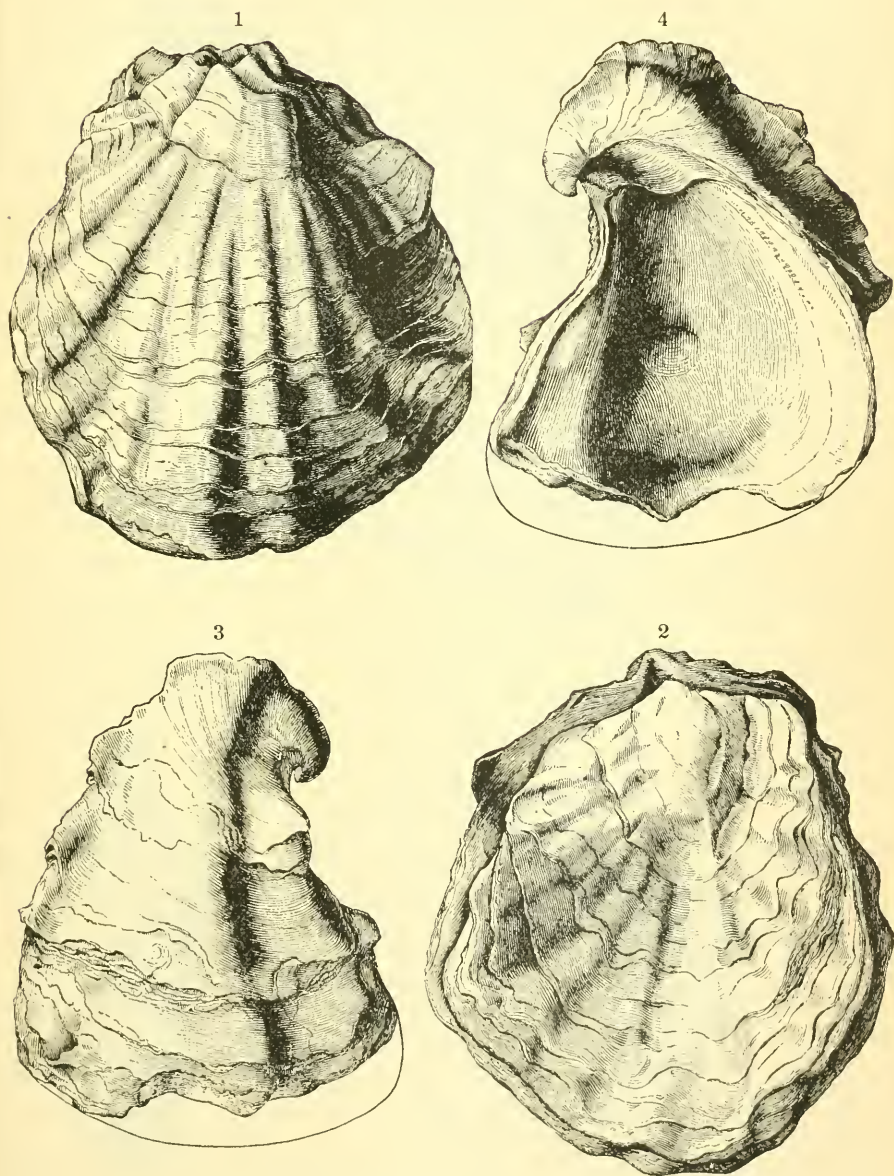


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EXOGYRA WINCHELLI.



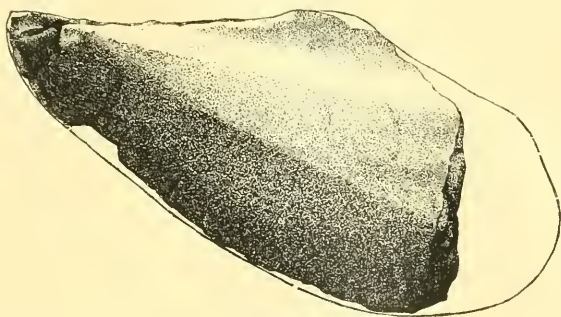


1 and 2.—*OSTREA BLACKII*.

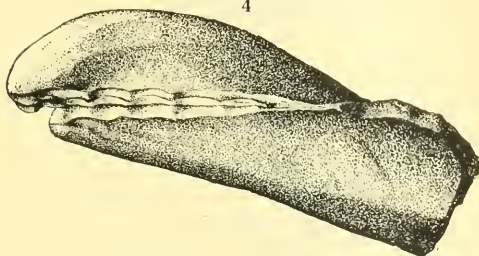
3 and 4.—*EXOGYRA FORNICULATA*.



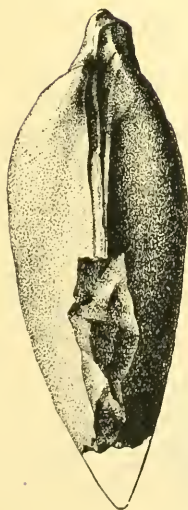
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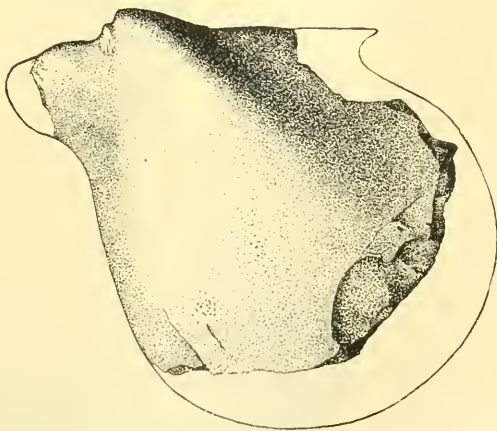
4



2

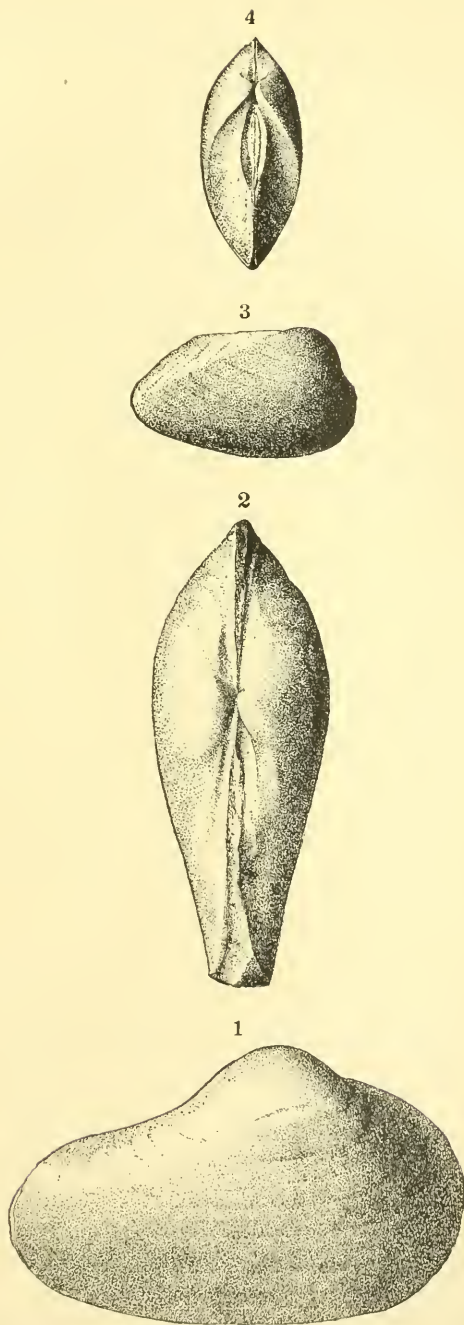


1



1 and 2.—*PTERIA SALINENSIS*.
3 and 4.—*GERVILLIA MUDGRANA*.





1 and 2.—*THRACIA MYLIFORMIS*.
3 and 4.—*PACHYMYA*? *COMPACTA*.



Kansas, where it was discovered by Prof. B. F. Mudge associated with the preceding species, and also with *Cyrena Dakotensis* Meek & Hayden and *Cardium? kansasense* Meek.

Genus PACHYMYA Sowerby.

Pachymya? compacta (sp. nov.). Plate 6, figs. 3 and 4.

Shell small, narrower posteriorly than anteriorly, slightly gaping behind; beaks depressed, approximate, incurved, directed forward, their position being very near the front; basal margin broadly convex; posterior margin narrowly rounded; postero-dorsal margin forming an oblique downward and backward truncation of that part of the shell; cardinal margin nearly straight, subparallel with the basal margin, much shorter than the full length of the shell; ligament short, its area depressed and sharply defined; front very short, depressed beneath the beaks and narrowly rounded below; umbonal ridges prominent and angular or subangular; the space above and behind them moderately broad and flattened; the remainder of each valve somewhat regularly convex. Hinge and interior markings unknown. Surface marked by the ordinary concentric lines of growth.

Length, 29 millimeters; height, 18 millimeters; thickness, both valves together, 14 millimeters.

This species is evidently congeneric with the shell which in the An. Rep. U. S. Geol. Sur. Terr. for 1877, p. 298, I described as *Pachymya? herseyi*, and also with the *Cypriocardia? texana* of Roemer, but knowing nothing of the hinge of either of these forms, I am not satisfied that they are properly referable to *Pachymya*; yet in all their external characters they seem to agree.

Position and locality.—Cretaceous strata, Bell County, Texas, where it was collected by Mr. D. H. Walker.

Genus THRACIA Leach.

Thracia myæformis (sp. nov.). Plate 6, figs. 1 and 2.

Shell transversely subovate in marginal outline; valves nearly equal; anterior end regularly rounded; wider and thicker anteriorly than posteriorly; posterior portion narrowed vertically and somewhat compressed but gaping at the extremity; basal border broadly convex; posterior border abruptly rounded; cardinal margin slightly convex, but the prominent umbones give the shell a concave appearance behind the beaks; a distinct linear depression is seen in the natural cast upon each side of the ligament; beaks prominent, incurved and directed a little forward; muscular impressions not distinctly shown in our examples, which are natural casts in chalky limestone, but the pallial sinus appears to have been large and subangular at its anterior end. Surface marked by the ordinary lines of growth, and also by more or less distinct irregular concentric wrinkles.

Length, 57 millimeters; height from base to umbo, 37 millimeters; thickness, both valves together, 24 millimeters.

In general aspect this shell approaches *T. prouti* Meek & Hayden, from the Upper Fox Hills Group of the Upper Missouri River region, but it differs in being proportionally narrower and more produced behind the beaks, and in the greater prominence of the umbones.

Position and locality.—Cretaceous strata, Bell County, Texas, where it was collected by Mr. D. H. Walker.

WASHINGTON, December 4, 1879.

NOTES ON A COLLECTION OF FISHES OBTAINED IN THE STREAMS OF GUANAJUATO AND IN CHAPALA LAKE, MEXICO, BY PROF. A. DUGÈS.

By DAVID S. JORDAN.*

The collection which forms the subject of this paper was obtained by Prof. A. Dugès in the streams of the province of Guanajuato in Mexico, and by him forwarded to the Smithsonian Institution. Many of them are extremely interesting as representing the ordinary North American fish fauna at a point near its southern limit, before it gives place to the Central and South American forms.

Chirostoma estor Jordan, sp. nov.

Allied to *Chirostoma humboldtianum* (C. & V.).

Body elongate but rather robust for the genus, the depth about one-sixth the length to the base of the caudal.

Head very large, pike-like, forming more than one-fourth (two-sevenths) the length to base of caudal.

Mouth very large, the maxillary reaching to past the front of the eye. Intermaxillaries forming the edge of the jaw strongly curved, their posterior portions broadly dilated as in *Chirostoma menidium*. Teeth strong, in several series in each jaw. Two small fang-like teeth on the front of the vomer. Lower jaw considerably projecting beyond the upper. Eye large, anterior, 5 in length of head, shorter than snout, and a little narrower than the interorbital space, which is nearly flat.

Head covered with scales, which are smallest on the occipital region, and largest on the lower part of the cheeks. Smaller scales on the interopercle.

Sides of head vertical, a conspicuous ridge along the edge of the top of the head above and behind the eye.

Scales small, anteriorly crowded, about 72 in a longitudinal series, and 18 in a cross series. Posterior margin of scales strongly crenate, so that the fish feels rough to the touch.

* As Professor Jordan is far distant while this paper is going through the press, the proof has been compared with his manuscript by the editor of these Proceedings. In the description of *Zophendum australe* two verbal additions are indicated in parentheses.

Pectorals moderate, nearly half as long as head, reaching slightly past the base of the ventrals. Ventrals rather short, reaching nearly two-thirds the distance to the base of the anal.

Anal moderate, beginning considerably in front of the dorsal and ending a little behind it. Anal rays I, 18. Dorsal rays V-I, 12.

Spinous dorsal beginning nearly midway between insertion of ventrals and anal, separated from the soft dorsal by a distance equal to about two-thirds the length of the base of that fin.

Caudal somewhat forked.

Coloration uniform in spirits, the silvery lateral band but faintly indicated.

The type of this species, $10\frac{1}{4}$ inches long, was obtained by Professor Dugès in Lake Chapala, Mexico; it is known as *Pesce blanco di Chapala* ("poisson blanc de Chapala") in Guanajuato, according to Professor Dugès.

It is one of the very largest of the *Atherinidae*, resembling a pike in its form, and in the large head and mouth. Its nearest relative is apparently *Chirostoma humboldtianum*, also from Mexico, from which it differs in the much smaller scales, as well as in other characters. In Dr. Girard's arrangement of the *Atherinidae*, this species would be likewise a *Heterognathus*.

The type of *Chirostoma estor* is numbered 23124 in the register of the U. S. National Museum.

Chirostoma humboldtianum (C & V.) Jor. (*Atherina vomerina* C. & V.).

With the preceding is a single specimen of another *Chirostoma*, which seems to be the *humboldtiana* of Cuv. & Val., with which the *vomerina* is doubtless identical. This specimen (No. 23136) has the usual silvery band. D. IV-I, 10; A. I, 15 or 16; lat. l. 50, the scales with entire edges. The long head is $4\frac{1}{4}$ in length to base of caudal, and the body is rather slender. This example is $3\frac{3}{8}$ inches in length.

? ***Chirostoma brasiliensis*** (Quoy & Gaimard) Jor.

Numerous specimens (catalogue number 23135) of a small *Chirostoma* allied to *brasiliensis* and *bonanensis* are in the collection. The body is short and compressed, the mouth small and oblique. Lat. l. 36; L. trans. 9. D. IV-I, 9; A. I, 17. Silvery lateral streak very narrow. It does not fully agree with descriptions of either of the above species, and its habitat is remote from both. I do not, however, think it advisable at present to give it a separate name.

Goodea atripinnis Jordan, gen. & sp. nov.

GENERIC DESCRIPTION.—Form of *Hydrargyra* or *Fundulus*, but with the intestinal tract elongate, the dentary bones movable, and the teeth slender, *tricuspid*, movable, attached in a single series on the outer edge of the jaws, not closely set. Fins small, the dorsal and anal similar,

the dorsal slightly in advance of the anal, without spines. Scales moderate. *Limnophagous*. Sexual changes, if any, unknown.

This genus differs from the most of the other *Cyprinodontidae* in its tricuspid teeth. From *Cyprinodon*, *Jordanella*, *Fitzroyia*, *Characodon*, and *Jenynsia*, the genera thus far known with tricuspid incisors, it is distinguished by the elongate intestines, and by the freeness of the dentary bones. The aspect is wholly unlike *Cyprinodon*, resembling rather *Fundulus*.

SPECIFIC DESCRIPTION.—Body oblong, considerably compressed, formed much as in *Hydrargyra*, the back nearly straight, little elevated, caudal peduncle deep. Depth of body $4-4\frac{1}{2}$ in length. Head short, broad, depressed, triangular and rather pointed, when viewed from the side.

Mouth quite small, anterior oblique, the lower jaw projecting. Both jaws with a series of rather slender tricuspid teeth, which are loosely inserted, and somewhat movable, not close enough set to form a continuous cutting edge. Head 4 in length. Eye moderate, directed partly downwards, $3\frac{1}{2}$ in head, rather longer than snout and little more than half the width of the very broad interorbital space. A slight ridge from the occipital region backward.

Scales rather large, 37 to 40 in a longitudinal series, and 13 in a transverse series. Humeral scale somewhat enlarged.

Fins small. Dorsal fin posterior, very slightly in advance of the anal, which is also short and low, the two fins about coterminous and falling far short of the caudal. Caudal short and small. Ventrals small.

Pectorals small, not reaching ventrals. Dorsal rays 12, anal rays 13.

Color bluish above in spirits, sides nearly plain, with a silvery streak along each series of scales. Vertical fins obscurely marked, each of them chiefly black, especially on the distal half. There is no evidence of any modification of the anal fin in any of the specimens, which are, however, apparently adult. One of the two larger ones is apparently a female, the other probably a male.

The intestinal canal is considerably convoluted and filled with mud.

The types of this species, No. 23137, are numerous specimens of various sizes; the two largest nearly 4 inches in length, were obtained by Professor Dugès at Léon in Guanajuato.

Zophendum australe Jordan, sp. nov.

Allied to *Zophendum siderium* (Cope), but with larger scales.

Body rather elongate, formed much as in *Campostoma anomalum*, somewhat compressed, the back somewhat elevated and rounded anteriorly. Depth, $4\frac{1}{2}$ in length to base of caudal.

Head rather large, slightly depressed or flattish above, its length about 4 times (in length) to base of caudal. Mouth moderate, low, the lower jaw slightly included, the premaxillary below the level of the eye, the maxillary just reaching the front of the eye. Lower jaw thin-edged,

and with a slight symphysial knob as in *Hybognathus*. Eye small, nearly 6 in head.

Scales rather small, 10-55-7 or 8, the lateral line complete, somewhat decurved.

Dorsal fin moderate, slightly behind ventrals, D. 8; A. 7. Anal rather high.

Pectorals not reaching ventrals, the latter (not reaching) to vent.

Teeth 4-4, not hooked, with broad grinding surface as in *Hybognathus*.

Color dark bluish above, scales everywhere with fine black punctulations. Sides without black spots. A black spot at base of caudal fin.

Peritoneum black; intestinal canal considerably elongate.

Types, numerous examples (23130-23131), 5 to 7 inches in length, taken by Professor Dugès in Lake Tupataro in Guanajuato, Mexico. The less number of scales (55 instead of 88) well distinguishes this species from *Z. siderium*.

Hudsonius altus Jordan, sp. nov.

Allied to *Hudsonius fluvialis*.

Body moderately elongate, compressed, deep, the back somewhat elevated, the depth $3\frac{3}{4}$ in length to base of caudal.

Head short, somewhat depressed above, moderately pointed, $4\frac{1}{2}$ in length to base of caudal. Eye moderate, shorter than snout, 5 to 6 in length of head. Mouth medium, quite oblique, terminal, the premaxillary on the level of the pupil, the maxillary not reaching the front of the pupil. Jaws equal in the closed mouth. Preorbital large.

Scales rather large, not closely imbricated, 8-46-4. Lateral line strongly decurved, 19 scales in front of dorsal fin.

Dorsal fin high, inserted over the base of the ventrals. Dorsal rays I, 8. Anal I, 8. Caudal fin rather broad, forked, its peduncle deep and compressed.

Ventrals shortish, reaching vent. Pectorals falling just short of ventrals.

Teeth 4-4, hooked, with narrow grinding surface.

Color bluish above, sides silvery, fins plain.

Types, several specimens, numbered 23129, the largest about 8 inches in length, obtained by Prof. A. Dugès in Lake Tupataro in Guanajuato.

This species differs from its northern relatives, *fluvialis*, *storerianus*, etc., in the larger head, the oblique mouth, and in the presence of but one row of teeth.

UNITED STATES NATIONAL MUSEUM,

Washington, December 18, 1879.

**DESCRIPTIONS OF TWO SPECIES OF FISHES COLLECTED BY PROF.
A. DUGÈS IN CENTRAL MEXICO.**

By TARLETON H. BEAN.

The larger portion of the fishes presented to the United States National Museum by Professor Dugès in June, 1879, have been reported upon by Prof. D. S. Jordan in a previous paper of these Proceedings.* In all 8 species were transmitted by Professor Dugès, 4 of them being described in the article just mentioned and 2 in the present paper as new to science.

The discovery of *Myxostoma* and *Amiurus* in streams which flow into the Pacific is singular and interesting, and, at the same time, the occurrence of additional genera, *Zophendum* and *Hudsonius*, characteristic of the Eastern United States, makes it desirable to know more of the climatic and statigraphic conditions existing in Guanajuato and adjoining provinces. *Goodea* and two of the *Chirostomas* are from a salt lake in the middle of a little volcanic plain in *Valle de Santiago*, Guanajuato.

Myxostoma austrina Bean, sp. nov.

The type specimens were collected at Piedad, in Morelia (Michoacán), Mexico. They are numbered 23120 and 23121 in the United States National Museum catalogue. The species may belong to *Minytrema* rather than *Myxostoma*; but in the absence of all the abdominal viscera this point cannot now be settled. It has a remarkably small fontanelle.

DESCRIPTION.—Body not elongate, rather stout. Lips plicate, truncate or slightly rounded behind.

The greatest height of the body equals about $\frac{1}{3}$, and the least height of the tail $\frac{1}{10}$ of the length of body.†

The length of the head (.23–.24) is contained $4\frac{1}{3}$ times in length of body. Its width (.15) equals the length of the base of the dorsal. The interorbital distance (.095) equals the length of the snout. The length of the operculum (.07–.075) equals $\frac{1}{2}$ the length of the ventral. The long diameter of the eye (.04) is contained 6 times in the length of the side of the head.

The distance of the dorsal from the snout (.45) equals 3 times the length of its base; the beginning of the dorsal is equally distant from the tip of the snout and the end of the anal. The longest dorsal ray (.16) is twice as long as the last (.08), and its length is contained 5 times in the distance of the anal from the snout.

The length of the base of the anal (.085–.09) is contained twice in the distance from the snout to the nape. The longest anal ray (.22) equals in length the external caudal rays, measuring these from the origin of the middle caudal rays. The last ray of the anal is as long as the snout.

The length of the middle caudal rays (.13) equals about $\frac{1}{2}$ the height of the body.

The distance of the pectoral from the snout (.25) is contained 4 times

*Proc. U. S. Nat. Mus., vol. ii, p. 298.

†Length of body is to be understood as length without the caudal.

in length of body, and the length of the pectoral, 5 times. When extended, the pectoral reaches the 11th or 12th scale of the lateral line.

The distance of the ventral from the snout equals $3\frac{1}{2}$ times the length of the ventral.

Radial formula: D. II, 11; A. II, 6; C. 18 (developed rays); P. I, 16-17; V. I, 8. Scales $6\frac{1}{2}$ -44- $6\frac{1}{2}$.

Colors: Upper portion light brown (in the alcoholic specimens), lower parts yellowish; some scales on the sides of the body are light brown at the base, in which respect the species resembles one of the varieties of *M. macrolepidota*. The ventrals and the right pectoral of specimen 23120 have dark blotches on their lower surfaces, the ventral of the right side being almost banded. The right pectoral and the left ventral of specimen 23121 bear fewer similar blotches. The bellies of both specimens have several markings of the same kind.

Table of measurements.

Species: *Myxostoma austrinum* Bean.

Current number of specimen.....	23120.		23121.	
Collector's number.....	1.		1.	
	Milli- meters.	100ths of length without caudal.	Milli- meters.	100ths of length without caudal.
Length to origin of middle caudal rays.....	303		285	
Body:				
Greatest height.....		27		24
Greatest width.....		15.5		16.5
Height at ventrals.....		24.5		21.5
Least height of tail.....		9.5		10
Length of caudal peduncle.....		15.5		13
Head:				
Greatest length.....		23		24.3
Distance from snout to nape.....		18		17
Greatest width.....		15		15
Width of interorbital area.....		9.5		9.6
Length of snout.....		9.5		9
Length of operculum.....		7		7.5
Distance from snout to orbit.....		9.5		9.5
Diameter of orbit.....		4		4
Dorsal:				
Distance from snout.....		45.5		45
Length of base.....		15.5		15
Length of longest ray.....		16		16
Length of last ray.....		8		8
Anal:				
Distance from snout.....		80		81
Length of base.....		9		8.5
Length of longest ray.....		22		22
Length of last ray.....		9.5		10
Caudal:				
Length of middle rays.....		13		13
Length of external rays.....		22		22.5
Pectoral:				
Distance from snout.....		25		25.5
Length.....		21		19
Ventral:				
Distance from snout.....		52		54
Length.....		15		15½
Branchiostegals.....				
Dorsal.....	II, 11		III	
Anal.....	II, 6		II, 11	
Caudal.....	+ 18 +		II, 6	
Pectoral.....	I, 17		+ 18 +	
Ventral.....	I, 8		I, 10	
Number of scales in lateral line.....	44		I, 8	
Number of transverse rows above lateral line.....	6½		44	
Number of transverse rows below lateral line.....	6½		6½	

Amiurus Dugèsi Bean, sp. nov.

This species is allied to *A. albidus* (Le Sueur) Gill, but has a much narrower head as is shown in comparing the width (greatest extent) of the intermaxillary band of teeth in the two species. The head of *A. Dugèsi* is also longer in proportion to the length of the fish without caudal, and the humeral process is slightly furrowed, and not strongly rugose as in *A. albidus*. The pectoral spine is not serrate. *Amiurus Dugèsi* has the supraoccipital well separated from the second inter-spinal buckler.

The typical specimens are numbered 23122 and 23123 in the Fish Catalogue of the Museum. They were received from Prof. A. Dugès in June, 1879, and were marked in his invoice as coming from the Rio Turbio in the province of Guanajuato, Mexico.

DESCRIPTION.—The height of the body is contained $4\frac{1}{2}$ to 5 times in its length without caudal. The distance from the end of the anal to the origin of the middle caudal rays is a little more than half the length of the head.

The length of the head (.29) exceeds its greatest width (.21-.23) by one-third. The maxillary barbel can be made to reach the pectoral spine, and is contained 5 times in the length of the body. The distance between the eyes (.125) equals 4 times their long diameter (.03). The length of the snout is about $\frac{1}{3}$ of that of the head (in the smaller example somewhat less). The width (greatest extent) of the intermaxillary band of teeth (.095) is less than $\frac{1}{3}$ of the length of the head (nearly $\frac{1}{2}$ in *A. albidus*). The length of the maxillary (.04-.045) is about $\frac{1}{3}$ of the inter-orbital distance. The posterior nasal barbel is a little less than $\frac{1}{3}$ as long as the maxillary barbel.

The first dorsal begins midway between the end of the snout and the beginning of the adipose dorsal. The length of its spine is about equal to the length of the base of the adipose dorsal. Its longest ray is contained 6 to 7 times in the length of the body.

The distance of the anal from the snout equals 3 times the length of its base. The longest anal ray is as long as the ventral.

The middle caudal rays are one-half as long as the external, measuring from the origin of the former.

The distance of the pectoral from the snout (.26-.27) equals one-half that of the ventral from the snout. The length of the pectoral spine is contained $2\frac{1}{2}$ times in that of the head. The longest pectoral ray (.15-.16) is a little more than $\frac{1}{2}$ as long as the head.

Radial formula : B. VIII; D. I, 6; A. 21-22; C. 17 (developed rays); P. I, 8; V. I, 7.

The lateral line is almost complete.

Colors : Plumbeous above, silvery white beneath and on the sides.

Table of measurements.

 Species: *Amiurus Dugesi* Bean.

Current number of specimen	23123.		23122.	
Collector's number	13.		13.	
	Milli- meters.	100ths of length without caudal.	Milli- meters.	100ths of length without caudal.
Extreme length	385	-----	356	-----
Length to origin of middle caudal rays	324	-----	300	-----
Body:				
Greatest height	66	20.5	67	22.3
Greatest width	55	17	53	17.5
Height at ventrals	60	18.5	64	21.5
Length of caudal peduncle*	56	17.3	47	15.6
Head:				
Greatest length	94	29	88	29
Length of maxillary barbel	61	19	61	20.5
Greatest width	69	21	68	23
Width of interorbital area	40	12.5	37	12.3
Length of snout	32	10	26	8.66
Extent of intermaxillary band of teeth	30	9.5	28	9.5
Length of maxillary	14	4.5	13	4
Length of posterior nasal barbel	20	6	20	6.66
Distance from snout to orbit	37	11	33	11
Diameter of orbit	10	3.25	9	3
Dorsal (first):				
Distance from snout	124	38.5	116	38.5
Length of base	27	8.5	27	9
Length of first spine	31	9.5	34	11.5
Length of longest ray	47	14.5	47	16
Length of last ray	20	6	21	7
Dorsal (adipose):				
Length of base	29	9	32	11
Length	25	7.66	24	8
Anal:				
Distance from snout	206	64	195	65
Length of base	71	22	68	23
Length of longest ray	37	11.5	39	13
Length of last ray	16	5	15	5
Caudal:				
Length of middle rays	32	10	30	10
Length of external rays	64	20	65	22
Pectoral:				
Distance from snout	84	26	80	27
Length of pectoral spine	38	12	34	11.33 $\frac{1}{3}$
Length of pectoral	48	15	48	16
Ventral:				
Distance from snout	164	51	155	52
Length	37	11.5	35	12
Branchiostegals	VIII	-----	VIII	-----
Dorsal	1,6	-----	1,6	-----
Anal	22	-----	21	-----
Caudal	+ 17 +	-----	+ 17 +	-----
Pectoral	1,8	-----	1,8	-----
Ventral	1,7	-----	1,7	-----

*From end of anal to origin of middle caudal rays.

 UNITED STATES NATIONAL MUSEUM,
 Washington, December 20, 1879.

Proc. Nat. Mus. 79—20

March 25, 1880.

**REPORT OF EXPERIMENTS UPON THE ANIMAL HEAT OF FISHES,
MADE AT PROVINCETOWN, MASS., DURING THE SUMMER OF 1879,
IN CONNECTION WITH OPERATIONS OF THE UNITED STATES
FISH COMMISSION.**

By J. H. KIDDER, Surgeon, U. S. NAVY.

SIR: The investigation of the manifestation of animal heat by fishes, with which you intrusted me last summer, having been brought to a pause for the time being by the close of the Fish Commission's summer work, I submit the following report of my experiments, so far as they have gone, with a description of the instruments used and the mode of observation.

But little in the way of actual experiment relating to this interesting question seems to have been done by other observers than those connected with the Fish Commission, although numerous allusions to the remarkable adaptability of fishes to extremes of temperature, and occasional records of more or less incomplete experiments, are to be found scattered through scientific literature. A complete bibliography of these fragmentary notes would be voluminous and of questionable value, but a short account of such observations as I have been able to find a record of, either interesting in themselves or of incidental value as throwing light upon the investigation, is appended to this report.

So far as I have been able to learn, all of the observations made hitherto upon the temperature of fishes have been confined to the intestinal canal, the thermometer being passed into the rectum or œsophagus, as is the usual practice in observations upon the body temperature of mammals. But the conditions are by no means the same. The intestinal canal of a fish is thin and scarcely muscular; the walls of the abdomen are also thin, and so sparingly vascular that no blood flows when they are cut through; and consequently, always surrounded as they are by water, against the chilling effect of which there is no sufficient protection, it is by no means in the rectum or stomach that we should reasonably look for the body temperature of a fish. In point of fact, the experiments to be hereinafter detailed show clearly enough that the rectum temperature of a freshly-taken fish rarely exceeds that of the water in which it swims by so much as a degree (Fahrenheit). So that it may be quite safely taken as an index to the latter temperature when there is no deep-sea thermometer at hand.

Another point to be considered is the fact that the gills of most fishes float freely in the surrounding water, and that all of the blood in each individual must, in passing through these organs, be spread out so as to expose the greatest possible surface to the chilling effect of the water quite long enough to reduce it to the same temperature.

From the low organization of fishes, and from the simplicity of their digestive and circulatory functions, considered together with the fact

that their blood itself is chilled by close proximity with the surrounding water at least once in each circuit, and that thus the oxidation of the blood, so important a source of animal heat in mammals, is quite neutralized, we ought not to expect so great a difference in temperature between the blood of a fish and the water in which it swims as obtains between the blood of mammals and the surrounding medium, nor that the limits within which its normal temperature must be confined should be so narrow.

And, while it is difficult to believe that the chemical changes necessary to the nutrition, waste, and repair of the body of a fish, taken together with its active muscular movements, can go on without the evolution of a large amount of animal heat; it is also plain that we are not to expect to find the manifestation of this heat either in the intestinal canal, a mere osmotic tube for the passage and absorption of the food, scarcely vascular and barely separated from the surrounding water by the thin bloodless walls of the abdomen; nor in the arterial blood returning from the gills, chilled down to the temperature of the water with which it has just been in intimate contact.

We should expect to find the blood of a fish at its warmest after having been distributed to the substance of the body, having furnished the material for nutrition, taken up the results of waste, and received the heat developed by these processes and by the conversion of muscular motion; that is to say, in the heart and branchial artery.

The experiments to be described have been tentative for the most part, and accordingly temperatures have been taken in the rectum, the stomach, various parts of the muscular tissue, the large venous trunks, the cavity of the "thorax"* after opening the heart, the interior of the heart and branchial artery, and the young fish in the ovary (of a dog-fish). When the heart was large enough to admit the bulb of the thermometer, the greatest differences between the temperatures of the fish and of the surrounding water were found in that locality.

INSTRUMENTS.

The thermometers used in these experiments were made expressly for the purpose by Mr. John Tagliabue, of No. 66 Fulton street, New York; and have proved to be very satisfactory. They are fifteen in number, viz:

1. Two long thermometers, graduated in fifths of a degree, and covering the range from 32° to 100° F., for use as standards.
2. A set of five short thermometers, graduated in fifths, marking 10° each, and covering all together the range from 40° to 90° F.
3. A second set of six short thermometers, similar to those last named, marking from 7° to 15° each, and covering the range from 30° to 100° F.
4. A short thermometer with the end carrying the bulb curved upon

*The term "thorax" is used for convenience' sake, as indicating the anterior part of the body cavity, in the neighborhood of the heart.

itself like a crook, graduated in fifths and marking from 55° to 74° F. (self-registering).

5. A Negretti-Zambra deep-sea thermometer, graduated in degrees only, and ranging from about 25° to 100° F.

All of these excepting the Negretti-Zambra are graduated upon the stems. The three highest in range of lot 2, one of the long standards, and the crooked instrument were made at first self-registering, on the principle of clinical thermometers, by a break in the column of mercury. They were so ordered in the hope that it would be possible to make some of the experiments upon living fish in tanks where the water could be artificially warmed above the temperature of the air. Such experiments not being possible (for reasons known to you) the self-registration was destroyed by reuniting the broken mercury column, and the necessary small correction applied. The curved thermometer was intended for use in a living fish, the bulb to be inserted either into the rectum or into an incision in the muscular tissue, and the stem to be secured to the body of the fish, which was then to swim free in the water. The highest temperature reached would be registered by the thermometer. This instrument, like the other self-registering thermometers operating on the same principle, can only be made available when the temperature of the water is above that of the air, and there has, therefore, as yet been no opportunity to make use of it.

Owing to the curious molecular change which occurs in the glass of which thermometers are made, whereby, after from six months to a year, the instruments show an error of excess of from half a degree to a degree, these thermometers, which were necessarily "pointed" as soon as made, are not strictly accurate. They should be returned to the maker and rated again before being used next summer, so that the necessary correction may be applied. For the time being the error has been to some extent met by Mr. Tagliabue, who has "overpointed" the scale about half a degree. I would also suggest the propriety, in case you conclude to continue temperature-observations, of ordering in advance one or two long thermometers, marking from 30° to 100° F., to be "pointed" after six months and used as absolute standards. Since, however, in these observations, absolute temperature is less important than *relative* accuracy, I have taken much pains to rate all the instruments together, comparing them with the standard, and applying such corrections as will reduce all the readings to its scale. The same error, if any, will then be present in all observations, and *relative* accuracy will be preserved. In Table A, which contains the corrections deduced from more than three hundred separate comparisons taken at nearly every degree on the scale, the small thermometers in daily use are numbered from 1 to 5 for the first set, and from 6 to 12 for the second set (which has not yet been used), No. 1 being the thermometer of lowest scale. The comparisons were made by immersing the thermometers in water, artificially cooled or heated. Only the means of each 10° are given in the table.

No. 1 of the small thermometers and Negretti & Zambra's Nos. 43230 (between 70° and 80°), 38982, 40007, 42666, and 43227 (between 70° and 90°), are the only ones to which it is worth while to apply a correction in practice. The other differences, being less than half a degree, may be disregarded as not likely to exceed the ordinary errors of observation.

 TABLE A.—*Thermometer corrections.*

Thermometer.	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°	90°-100°
No. 1		Add 0.88°					
No. 2			{ Subtract 0.05°				
No. 3				{ Subtract 0.125°			
No. 4					Correct.		
No. 5						{ Subtract 0.13°	
No. 6	Correct.						
No. 7		Correct.					
No. 8			Correct.				
No. 9				Correct.			
No. 10					{ Subtract 0.7°		
No. 11						Correct.	Correct.
N. & Z., 38982 ..		Add 0.86°	Add 1°	Add 0.7°			
N. & Z., 40007 ..	Correct.	Add 0.5°	Add 0.5°	Add 0.5°	Add 0.5°	Correct.	Add 1°
N. & Z., 42666 ..	Correct.	Add 0.5°	Add 1°	Add 1°	Add 0.5°	Correct.	Add 1°
N. & Z., 43230 ..		Add 0.125°	Add 0.07°	Add 0.366°	Add 0.425°	Add 0.5°	
N. & Z., 43227 ..		Add 0.35°	Add 0.05°	Add 0.236°	Add 0.5°	Add 0.5°	

There are some practical difficulties in the use of these delicate instruments, which it is well to mention.

1. The bulbs are long and large compared to the diameter of the column of mercury. Hence the latter is very sensitive and responds quickly to the heat of the hand, even through the walls of the heart, or, in small fishes, of the abdomen. Thus in a small living blue-fish (*Pomatomus saltatrix* (Linn.), Gill), observed September 8, in an aquarium-tank, the water being at 67° F., a thermometer passed into the stomach by way of the gullet showed 68.8°; but, holding the fish in my left hand, I observed that the mercury was slowly rising and had reached 73° in two minutes. This accession of heat was communicated through the thin walls of the abdomen from my hand.

2. Owing to the extreme fineness of the mercurial column it is quite difficult to distinguish it at all from the empty part of the tube, unless the light falls upon it at exactly the proper angle. When taking the temperature of a struggling fish on the deck of a vessel, in the full glare of the sun, and with the thermometer perhaps smeared with blood, it is impossible to be too careful in guarding against errors of observations.

3. A difference of several tenths may be apparent in the reading according to the position of the observer. Looking down upon the column he reads too low; looking up, too high. His eye should be exactly opposite the top of the mercurial column. After use, the thermometer should be wiped perfectly clean and laid back in its proper bed in the case, lest in the hurry of the next observation the wrong one be taken up, and time lost.

4. The Negretti-Zambra deep-sea thermometers, which depend for their self-registration upon the breaking of the mercurial column at a certain place when the instrument is overset in pulling it up, have sometimes a trick of breaking the column in the wrong place, and so giving a false indication. In one instance I noticed that the break was diagonal, instead of being directly horizontal, as it should have been. Professor Hind, of Halifax, informs me that he has noticed the same defect and has brought it to the notice of the makers, who have assured him that it has been corrected in their more recent form of instrument. It should also be always remembered that the temperature recorded by these instruments is not that of the bottom, but of about a fathom above it, owing to the play of line required in attaching them to the sounding-line so that they may overset easily and not strike against the lead.

MODE OF OBSERVATION.

The circumstances of the summer's work are too well known to you to require repetition here. In explanation of the small number of observations (ninety-seven for the whole summer) it will be sufficient to refer to the unusual inclemency of the season, permitting not more than an average of two excursions a week; and to the remarkable scarcity of fish, which made a large proportion of the excursions blank as to results. Many fishes were brought up in the trawl-net of the *Speedwell* (the naval steamer used by the Fish Commission), but had been so long in the net, pressed upon by each others' weight, as to come up for the most part dead; and always showing by their rectum temperature (which should be near that of the bottom) that they were not in their normal condition as to animal heat. Such observations as were taken from these specimens are entered in the table (B), but are not trustworthy for the purposes of this investigation. On one occasion I set a trawl-line furnished with some four hundred hooks, and took it in as soon as set. Although not more than twenty minutes had elapsed between setting and hauling, however, most of the fishes taken were already drowned, and all had lost a large proportion of their animal heat. Since, therefore, no tanks of sufficient size for keeping fishes alive under observation were available, there remained only line fishing, which was carried on during the latter part of the summer as actively as the weather would permit, from the yacht *Phantom*, belonging to the Engineer Corps of the United States Army, and lent to the Fish Commission for the summer. The fish were all taken in Cape Cod Bay, and within ten miles of Provincetown, the two favorite localities being the steep edge of a shoal known as "Shank-Painter Bar," between Wood End and Race Point lights, and a ledge in 15 fathoms of water some seven miles southwest of Wood End light.

The rectum temperatures indicate, and I have no reason to doubt, that a fish caught with a line and hauled rapidly from the bottom to the

vessel's deck has not had time to materially change its temperature. The rectum usually showed from half a degree to a degree above the temperature near the bottom as indicated by a deep-sea thermometer.

Having arrived on the ground and anchored, the first proceeding was to sound and take the temperature of the water near the bottom by means of a Negretti-Zambra thermometer attached to the sounding-line, about half a fathom above the lead. The temperatures of the surface water and of the air were then taken with the same thermometer, and, where the depth exceeded 20 fathoms, another observation was made at 15 fathoms for subsequent comparison. As soon as a fish had been taken it was seized and held firmly by an assistant, his right hand grasping the throat under the gill-covers and his left holding the narrowest part of the tail, while I passed a thermometer into the rectum and observed the temperature of that part. I then cut the fish open from the isthmus between the gills toward the belly, exposing the heart, through the walls of which the thermometer was passed into the branchial artery and the temperature taken again. In this last manœuvre the heart should not be held between the finger and thumb of the left hand any longer than necessary to pass the thermometer-bulb into the artery, lest heat be communicated from the hand through the walls of the heart and give too high a reading. Then followed observations upon the temperature of the muscular tissue or other parts, when such were taken. When the fish was too small to admit the bulb of the instrument within the heart an effort was made to take the temperature of the blood as it flowed from it, or the temperature of the liver was taken, or, in very small fishes, the thermometer was passed into the stomach, through the œsophagus.

The above procedure is that finally adopted, after reflection upon the unsatisfactory results following observations made in the ordinary way (in the rectum). As to the cruelty of the operation, I am inclined to believe that it is more apparent than real, the fish showing no consciousness of pain, by struggling, &c., after the first incision.

RESULTS.

This summer's work must be considered to be, as I have said, only experimental. The subject had to be studied from the beginning, with no records of previous similar experiments to go by, and many observations were wasted in learning how to proceed. Enough has been ascertained, I think, to show that fishes do develop animal heat by their own vital processes in the same manner as, but to a less degree than, other vertebrate animals. In other words, it appears from these experiments that when proper precautions have been observed in making the experiments all living freshly-caught fishes will be found to manifest a body temperature differing considerably from that of the water in which they swim; the degree of difference varying with the perfection of the organization of the fish (and hence the activity of its nutrition), and with the temper-

ature of the water in which it swims. Thus the dogfish (*Squalus acanthias*, Linnaeus) possessing a far more perfect digestive and circulatory system than the cod, shows a much greater excess of blood temperature above that of the surrounding water; and cod taken at the depth of 15 fathoms in water at 52° F., show a less excess than others taken in 25 fathoms at 41°, but a greater excess than blue-fish (*Pomatomus saltatrix* (Linn.) Gill) taken at the surface, at 69° and 70°, which is presumably nearer the normal temperature of the last-named fish.

Upon this question of normal temperature, my observations have not thrown much light, owing to the fact that nearly all the fishes observed have come from water at about the same temperature, and that blue-fish, from which the most valuable results were to be expected on account of their activity and the warmth of the water which they inhabit, could not be taken with a line after the two days of their first appearance. It is reasonable to suppose, from the fact that the cod, for instance, shows a less difference when taken from warmer than from cold water, that a point would soon be reached at which the temperature of the blood of the fish would coincide with that of the surrounding water, and that this point would be near the "normal" for that family, or in other words the limit above which it could not live.*

The experiments are set forth at length in Table B, but some of the conclusions for which they furnish a reasonable basis may be conveniently stated here, considering each species separately.

1. CGD (*Gadus morrhua*, Linnaeus). Twelve observations. The fishes were taken with a hand-line, either at the edge of "Shank-Painter Bar," a sand-bank about half a mile wide which makes out along the end of Cape Cod from Race Point to Wood End light-house, in 22-25 fathoms of water, or on the "Ledge," a small rocky shoal lying about seven miles WSW. from Wood End light, where there are from 13 to 15 fathoms of water, according to the state of the tide. The rectum showed an average excess of 0.97° above the temperature of the water near the bottom. In the bloody fluid resulting from the mixture of water with the blood escaping from the heart into the "thorax," the average excess of temperature was 3°, and in the heart itself 4.63°. In one instance an incision was made into the side of a very large cod, from which *arterial* blood gushed forth. A thermometer plunged into this incision showed only 1.5° excess over the temperature of the water near the bottom. It was this observation which suggested the thought that the venous blood might be warmer than the arterial.

*Prof. G. Browne Goode, who has been investigating the question of the temperatures preferred by different fishes, concludes that the cod and its congeners seek water at 38° to 42° F.; that the temperature range of menhaden lies between 50° and 75°; that blue-fish are rarely to be found in water below 40°, or mackerel below 45°; while black bass (*Micropterus*) thrive in the water of the northern lakes, frozen over for three months in the year and never rising above 65°, as well as in that of the Florida rivers, which becomes as warm as 90° in summer. Different families, as thus appears, show very different powers of adaptation to extremes of temperature.

2. HADDOCK (*Melanogrammus aeglefinus* (Linn.), Gill). Eight observations. The rectum showed an average excess of 1.3° over the temperature of the water near the bottom, and the circulation an average of 5.3° . One fish, after ten minutes spent in a tub of water at 64.2° , showed an increase of temperature in the rectum of 7° . Another, which had been tied by the tail and allowed to swim 15 minutes at the surface (at 69.5°) showed an increase (in the rectum) of 16.8° ; still 11.5° below the temperature of the water. On the 6th September, fishing on the "Ledge," the temperature of the water near the bottom at $15\frac{1}{2}$ fathoms was 51.5° , while the recta of the first two or three fishes caught showed as low a temperature as 45° . Those caught later, after fishing in the same place for an hour or more, showed a rectum temperature of 51° . I suppose that the individuals first taken (the tide having just turned to flood) came up on the ledge from deeper water, the ledge being of small extent, and showed the low temperature of the water from which they had come, gradually approximating that of the shallower water as they remained longer in it. These first temperatures are left out of the account in determining the above averages, as untrustworthy, owing to the uncertainty of the temperature of the water by which they had been surrounded. Haddock were spawning as early as the first observations (July 30), which fact may account for their somewhat higher temperatures than those of cod taken at the same time.

3. POLLACK (*Pollachius carbonarius* (Linn.), Bonaparte). A single full-grown specimen, weighing about 25 pounds, was taken on the "Ledge" in 15 fathoms. The rectum temperature was 2.4° above that of the water near the bottom (42°), and that of the fluid in the thorax after opening the heart, 4.5° . Several of the young of this species were taken from the wharves of Provincetown at different times and examined. Seven specimens taken from a depth of 8 feet (temperature of water 60°), and measuring about 8 inches in length, showed an excess of 0.5° in the rectum, 0.6° in the stomach (passing the thermometer through the gullet), and 3.12° by the thermometer in the mass of intestines, &c., next the liver. They were in company with "tinker mackerel" (*Scomber Dekayi*, Storer), of a species not observed in this harbor for more than thirty years.

4. HAKE (*Phycis chuss* (Walb.), Gill). This fish was often taken at the same time with cod and haddock. Specimens were frequently brought up, dead, in the trawl-net. Those taken with a line were often too small for trustworthy experiment, but a very large individual, weighing over 35 pounds, taken August 11, in 25 fathoms of water, at 42° , furnished the most satisfactory observation of the season, owing to the large size of the heart and the sluggishness of the fish, which made it much easier than usual to be sure of the readings. In this instance the difference in temperature of the water near the bottom and that of the rectum was 2.4° , and between the bottom water and the heart, 9.8° . There was an ulcerated patch about 2 inches square on the side of the

head. Could this have been the cause of the unusually high temperature? The presence of spawn in the abdomen protected the rectum to some extent, no doubt, from the chilling effect of the water. Another specimen taken in 15 fathoms on the "Ledge" gave a difference of 3° between the temperatures of the rectum and heart, the bottom temperature being uncertain for reasons already stated. (See page 313.)

5. BLUE-FISH (*Pomatomus saltatrix* (Linn.), Gill). These were caught on only two occasions, although often fished for unsuccessfully. Four specimens on the first day and one on the second were taken by trolling, and brought in after violent resistance. The average rectum temperature of the first four was 0.25° higher, and the temperature obtained by an incision into the muscles of the side 1.55° lower than that of the surface water from which the fish came (73.2°). The surface water was unusually warm on this occasion, and the fishes may have come from a deeper and colder stratum. Otherwise the indication would appear to be that they resisted in some way the higher temperature than that to which they were accustomed. They were taken from different schools and at different times. The single fish taken on the following day showed a rectum temperature of 0.5° , and in the muscles of the side 1.7° above that of the surface water (70.5°). The muscles of the side of this last fish, however, were only 0.5° warmer than the average (71.5°) of the four taken the day before. At this time I had not yet begun to observe the temperature of the blood in the heart and branchial artery. Young blue-fish, 3 or 4 inches long, have been caught from the wharves at different times, but have been too small to afford trustworthy observations.

6. "TINKER MACKEREL" (young of *Scomber scomber*, Linnæus, and *Scomber Dekayi*, Storer). No fully-grown mackerel have been taken with the line in the neighborhood of Provincetown for several years. The "tinkers," however, from 6 to 8 inches long, abounded toward the last of the season, and upon these several observations were made at different times, the temperature of the surrounding water being taken at 6 feet below the surface, the length of line required in fishing. The anus was too small to admit the bulb of my thermometers, and temperatures were therefore taken in the stomach through the gullet, and in the immediate neighborhood of the liver after dividing the larger blood-vessels. The average of twelve observations gives an excess of temperature over that of the surrounding water of 4.1° in the stomach, and 5.25° in the neighborhood of the liver. The individual temperatures were surprisingly uniform. Three specimens of young *Scomber Dekayi*, taken from the wharf in 8 feet of water at 60° , showed an average excess of 2.3° in the neighborhood of the liver.

7. CHOGSET (*Tautogalabrus adspersus* (Walb.), Gill). Two observations were made upon a single small specimen in an aquarium-tank, the water being at 65.9° , and the thermometer passed into the stomach through the gullet. The excess of temperature over that of the water was 1.2° .

8. SCULPIN (*Cottus octodecimspinosus*, Mitchill). A single specimen showed an excess in the rectum of 0.8° , and in the neighborhood of the liver of 3.2° over the temperature of the surrounding water.

9. SEA-RAVEN (*Hemitripterus americanus* (Gmel.), Storer). A specimen kept alive in a tub on board of the Speedwell for three-quarters of an hour (the water marking 70.6°) showed an excess in the temperature of its circulation over that of the water of 4.4° . Another specimen brought up in the beam-trawl-net showed an excess in the rectum of 17.7° and in the heart of 18.9° over the temperature of the bottom water, but had been half an hour in the trawl, pressed closely on every side by a mass of fishes and sponges. So that the observation is valueless excepting in that it shows that even under abnormal conditions, so long as the fish lives, there is a difference between the temperature of the rectum and of the venous blood.

10. GOOSEFISH (*Lophius piscatorius*, Linnæus). This fish is admirably constructed for temperature experiments, being provided with a very large heart and branchial artery, and, moreover, with a highly organized digestive system. Unfortunately the only two specimens observed were brought up in the trawl-net with the above-named sea-raven, and had their body temperatures abnormally raised in the same manner. The difference in temperature between the rectum and the circulation was 4.4° .

11. EEL-POUT (*Zoarces anguillaris* (Peck), Storer). Two specimens taken in the trawl-net at the same time and under the same circumstances as the preceding showed a difference between the temperatures of the rectum and the circulation of only 0.5° , the fishes being almost dead. A single specimen taken afterwards with the hand-line showed an excess in the rectum of 3° , and in the neighborhood of the liver of 6° , over that of the surrounding water.

12. FLOUNDER (*Hippoglossoides platessoides* (Fabricius), Gill). In a single specimen taken on a trawl-line the temperature of the circulation was 3° above that of the water near the bottom.

13. DOGFISH (*Squalus acanthias*, Linnæus). This species was much the most abundant of any near Provincetown. Owing to the high organization of the digestive system of the order to which this fish belongs, it was to be expected that the heat resulting from the processes of nutrition would be found in it to be highest. Accordingly, as the table shows, the differences between the body temperatures and those of the surrounding water are here greater than those manifested by other fishes. In a series of five taken from cold water (40.4°) the average rectum temperature was 4.4° and that of the circulation 12° above that of the water near the bottom. The greatest difference occurred in a female, the ovaries of which contained well-developed young, in which case the circulation was 16.6° warmer than the surrounding water. A young dogfish about 9 inches long, with umbilical vesicle still attached, taken from this specimen, gave an excess of 20.6° in the heart above the temperature of the water, the greatest difference observed during the summer. In this young fish there was of course no cooling of the blood during its

passage through the gills (those organs not having yet come into use), nor otherwise than mediately through contact with the body of its mother. Another adult female with young in her ovisac showed an excess of 9.4° in the rectum (oviduct?) and 15.6° in the heart over the temperature of the water. In another series of fourteen observations upon specimens taken with a trawl-line, and half drowned when drawn up, the body temperatures had approximated that of the surrounding water. In this observation, too, the Negretti-Zambra thermometer failed to act, the column breaking in the wrong place, so that the temperature of the bottom water had to be guessed at from that of the recta of the fishes and from previous observations in the same neighborhood. It was probably not higher than 42° . Above this supposed bottom temperature the fourteen half-drowned dogfish gave an excess of 2.2° in the rectum and of 4.8° in the heart and "thorax." The greatest excess was 6.7° . Still another series of seven taken with a line on the "Ledge," when the indicated bottom temperature could not be relied on, for reasons already given (see p. 313), showed an average difference between the rectum and heart temperatures of 6.7° , while in another specimen the difference between the rectum and muscles was only 1.6° .

14. SKATE (*Raia erinacea* and *R. larvis*, Mitchell). Three individuals of the former species, which had been half an hour with a number of other fish in the trawl-net, and were therefore useless for comparison with the bottom water, showed an excess in the temperature of the blood over that of the rectum of 3.1° . Four individuals of the latter species (*R. larvis*) taken on the "Ledge," when the temperature of the water from which the fish came was unknown, gave a difference between rectum and circulation of 2.9° .

SUMMARY.

Throwing out doubtful and imperfect observations, the results of those experiments in which the circumstances were most favorable to accuracy, may be summed up as follows:

Fish.	Temperature of surrounding water.	Temperature of rectum above water.	Temperature of circulation above water.	Remarks.
Cod.....	39° - 42°	0.98°	4.63°	
Haddock.....		1.3°	5.3°	
Pollack.....	42°	2.4°	4.5°	
Hake.....	42°	2.4°	9.8°	Spawning.
Blue-fish.....	73.2°	0.25°	1.55° below.	
Do.....	70.5°	0.5°	1.7° above.	
"Tinker" mackerel.....	65°	4.1°	5.25°	"Thorax."
"Tinker," <i>S. Dekayi</i>	60°		2.3°	Do.
Sculpin.....	60°	0.8°	3.2°	Do.
Sea Raven.....	70.6°		4.4°	Stomach.
Eel Pont.....		3.0°	6.0°	
Flounder.....	42°		3.0°	
Dogfish.....	42°	4.4°	12.0°	
Dogfish, young in ovary.....	42°		20.6°	

Ninety-seven fishes have been observed during the summer, but many of the observations are of doubtful value, as has been explained in the foregoing pages. Such as the experiments are they appear to me to point to the following conclusions:

First. All fishes develop animal heat, its quantity varying according to the organization rather than the habits of the family.

Second. This heat results from the processes of nutrition (chemical) and from the conversion of muscular motion (mechanical). That resulting from the oxidation of the blood is lost in the gills; hence the venous blood is decidedly warmer than the arterial.

Third. Spawning and breeding fishes develop more heat than those not carrying on these processes.

Fourth. Elasmobranchs and, generally, fishes with a highly differentiated digestive apparatus develop more heat than those of simpler organization, and (probably) very active surface fishes more than sluggish bottom fishes.

Fifth. The intestinal canal and arterial blood do not correctly indicate the animal heat of fishes.

Sixth. The question of "normal range of temperature" remains unanswered.

SUGGESTIONS.

Should you think it desirable to continue this investigation I would suggest that the inquiry include the following details, indicated by last summer's experiments:

First. The range of temperature through which living fishes may be carried. This might be observed by subjecting different species in tanks to varying temperatures produced by ice or steam introduced into the water, and noting the body temperature of the fish when it begins to show signs of distress. Each experiment would expend a fish, but the importance and practical bearing of this question of "normal range" of temperature might justify the expense. Much could be learned by observing the temperature of the water at which the fish begins to show signs of distress. In such a harbor as that of Provincetown a considerable difference in the temperature of the water can be got by towing a wooden-latticed tank into shallow water at ebb-tide and into suitable positions at flood-tide.

Second. Amount of oxygen required by different fishes. This may be approximated by keeping different species under observation in separate tanks without a fresh supply of water.

Third. Length of life after being withdrawn from the water, and subsequent duration of muscular irritability. Also the number of respirations per minute in different species when at rest.

Fourth. Influence of muscular movements on temperature. This may be observed by tying a fish by the tail, in the water, until it exhausts itself by struggling, and then taking the temperature, to be compared with an observation upon another individual of the same species under similar circumstances, but at rest.

Fifth. Comparative activity of nutrition as indicated by the percentage of nitrogenous matter in the excreta.

Sixth. The repetition of similar observations on the plan of those made last summer.

TABLE B.

Number of observation.	Date.	Number of instrument.	Depth.	Fish.	Temperature, bottom.	Temperature, surface.	Temperature, air.	Temperature, rectum.	Temperature, circulation.	Remarks.
1.....	1879.									
2.....	July 30	5	22 fathoms...	Cod.....	40	69.5	°	40.7	°	
3.....	July 30	5	do	Haddock.....	40	69.5	°	42.1	°	After 10 minutes in warm water.
4.....	July 30	4	do	do	40	69.5	°	48	°	
5.....	July 30	5	do	do	40	69.5	°	44.7	°	
6.....	July 30	4	Surface	do	40	69.5	°	58	°	No. 4, after 15 minutes swimming at surface.
7.....	July 30	5	22 fathoms	Cod.....	40	69.5	°	42.4	°	
8.....	July 30	5	do	Haddock.....	40	69.5	°	40.9	°	
9.....	Aug. 2	2	Surface	Blue-fish.....	40	73.5	°	75.6	°	
10.....	do	2	do	do	40	73.5	°	73.3	°	Temperature of circulation from incision in side; vein not opened.
11.....	Aug. 2	2	do	do	40	73	°	73.3	°	
12.....	Aug. 4	4	15 fathoms	Dogfish.....	44.5	70.6	°	72.2	°	Incision in side; vein opened.
13.....	Aug. 4	4	Tub.	Sea-raven.....	44.5	70.6	°	53.2	°	After 20 minutes in a tub on dock.
14.....	Aug. 6	2	Surface	Blue-fish.....	40.4	70.5	°	71	°	Thermometer in stomach. Fish had been 3 hour in tub at 70.6°.
15.....	Aug. 6	4-5	17 fathoms...	Dogfish ♀.....	40.4	70	°	49.8	°	Temperature of circulation from incision in side, in tub at 70.6°.
16.....	Aug. 6	4	do	do	40.4	70	°	57	°	Temperature of circulation from incision in side, branchial artery.
17.....	Aug. 6	4	do	Dogfish, young	40.4	70	°	61	°	Do.
18.....	Aug. 11	5	23 fathoms...	Cod.....	42	64.5	°	43.4	°	Young taken from ovary of No. 16.
19.....	Aug. 11	5	do	do	42	64.5	°	43.6	°	Temperature of circulation from incision in side, thorax.
20.....	Aug. 11	5	do	do	42	64.5	°	43.5	°	Do.
21.....	Aug. 11	5	do	Dogfish.....	42	64.5	°	43.8	°	Temperature of circulation in heart.
22.....	Aug. 11	5	do	Pollack.....	42	64.5	°	44.4	°	Temperature of circulation from fluid in thorax.
23.....	Aug. 11	5	do	Hake ♀.....	42	64.5	°	44.4	°	Temperature of circulation in heart.
24.....	Aug. 18	*	do	Chogset.....	42	63.8	°	67.2	°	In aquarium; thermometer in stomach by œsophagus.
25.....	Aug. 18	5	do	do	43.5	66	°	67	°	Same specimen as 24.
26.....	Aug. 25	3	31 fathoms	Bel-pout.....	43.5		°	63.2	°	After ½ hour in trawl-net.
27.....	Aug. 25	3	do	do	43.5		°	62	°	Do.
28.....	Aug. 25	4	do	Goosefish.....	43.5		°	50	°	Do.
29.....	Aug. 25	4	do	Skate.....	43.5		°	56.6	°	Do.
30.....	Aug. 25	3	do	do	43.5		°	61.2	°	Do.
31.....	Aug. 25	3	do	do	43.5		°	61.6	°	Do.
32.....	Aug. 25	3	do	Sea-raven.....	43.5		°	61.6	°	Do.
33.....	Aug. 25	4	27 fathoms	Skate.....	43.5		°	53.2	°	Do.
34.....	Aug. 25	4	do	Goosefish.....	43.5		°	52	°	Do.

34	Aug. 25	24 fathoms	Dogfish	41.9(?)	61.5	68	42.4	44.4	Taken on trawl-line and nearly drowned when examined. Deep-sea thermometer failed to act on this occasion, and bottom temperature is estimated from the temperatures of the rectum of the fish, and subsequent observations in same locality.
35	Aug. 28	do	do	41.9(?)	61.5	68	42.2	45	
36	Aug. 28	do	do	41.9(?)	61.5	68	42.4	47	
37	Aug. 28	do	do	41.9(?)	61.5	68	46.8	45.2	
38	Aug. 28	do	do	41.9(?)	61.5	68	46.8	46.8	
39	Aug. 28	do	Flounder	41.9(?)	61.5	68	44.8	44.8	
40	Aug. 28	do	Haddock	41.9(?)	61.5	68	47	47	
41	Aug. 28	do	Eel-pout	41.9(?)	61.5	68	47.9	47.9	
42	Aug. 28	do	Dogfish	41.9(?)	61.5	68	47.3	47.3	
43	Aug. 28	do	do	41.9(?)	61.5	68	44	44	
44	Aug. 28	do	do	41.9(?)	61.5	68	42	42	Taken at 6 feet below surface, temperature at which depth is given as "bottom temperature." Thermometer was inserted into stomach through oesophagus, and into thorax after division of vessels; results are given as "temperature of rectum" and "temperature of circulation."
45	Aug. 28	do	do	41.9(?)	61.5	68	44	44	
46	Aug. 28	do	do	41.9(?)	61.5	68	45.7	47	
47	Aug. 28	do	do	41.9(?)	61.5	68	44.5	45.9	
48	Aug. 28	do	do	41.9(?)	61.5	68	46.5	47.9	
49	Aug. 28	do	do	41.9(?)	61.5	68	42.7	48.5	
50	Aug. 28	do	do	41.9(?)	61.5	68	45.9	49.7	
51	Sept. 3	Near surface	Tinkermackerel	65	68-69	68	68.5	70.1	
52	Sept. 3	do	do	65	68-69	68	68.1	69.3	
53	Sept. 3	do	do	65	68-69	68	68.9	70.1	
54	Sept. 3	do	do	65	68-69	68	68.9	70.1	Muscles of side. Heart and branchial artery.
55	Sept. 3	do	do	65	68-69	68	68.9	70.9	
56	Sept. 3	do	do	65	68-69	68	69.1	70.9	
57	Sept. 3	do	do	65	68-69	68	69.3	70.3	
58	Sept. 3	do	do	65	68-69	68	69.3	70.3	
59	Sept. 3	do	do	65	68-69	68	69.7	70.1	
60	Sept. 3	do	do	65	68-69	68	68.9	70.1	
61	Sept. 3	do	do	65	68-69	68	69.3	70.1	
62	Sept. 6	15½ fathoms	Dogfish	51.5(?)	64.5	68	46.9	46.9	
63	Sept. 6	do	do	51.5(?)	64.5	68	45.9	51.9	
64	Sept. 6	do	do	51.5(?)	64.5	68	48.4	48.4	Taken on ledge, and presumed to have come from a deeper stratum of water of a probable temperature of 44.3°.
65	Sept. 6	do	Dogfish	51.5(?)	64.5	68	46.3	48.7	
66	Sept. 6	do	Hake	51.5(?)	64.5	68	45.5	48.5	
67	Sept. 6	do	Skate	51.5(?)	64.5	68	45.9	48.3	
68	Sept. 6	do	Haddock	51.5(?)	64.5	68	44.4	48.5	
69	Sept. 6	do	Dogfish	51.5(?)	64.5	68	48.9	48.9	
70	Sept. 6	do	do	51.5(?)	64.5	68	52	52	
71	Sept. 6	do	do	51.5(?)	64.5	68	51.9	51.9	
72	Sept. 6	do	do	51.5(?)	64.5	68	51.5	51.5	
73	Sept. 6	do	Skate	51.5(?)	64.5	68	49.9	49.9	
74	Sept. 6	do	Cod	51.5(?)	64.5	68	49.1	49.1	
75	Sept. 6	do	do	51.5(?)	64.5	68	50.5	50.5	
76	Sept. 6	do	do	51.5(?)	64.5	68	48.5	48.5	
77	Sept. 6	do	Skate	51.5(?)	64.5	68	50.9	50.9	
78	Sept. 6	do	Haddock	51.5(?)	64.5	68	49.9	49.9	
79	Sept. 6	do	Cod	51.5(?)	64.5	68	52.9	52.9	
80	Sept. 6	do	Haddock	51.5(?)	64.5	68	53	53	
81	Sept. 6	do	Cod	51.5(?)	64.5	68	53.2	53.2	
82	Sept. 6	do	do	51.5(?)	64.5	68	51	51	
83	Sept. 6	do	Hake	51.5(?)	64.5	68	51	51	

* Standard.

TABLE B—Continued.

Number of observation.	Date.	Number of instruments.	Depth.	Fish.	Temperature, bottom.	Temperature, surface.	Temperature, air.	Temperature, rectum.	Temperature, circulation.	Remarks.
84.	1879. Sept. 6	4	15½ fathoms	Cod	51.5(?)	64.5	68	50	54.8	Thorax.
85.	Sept. 6	5	do	Haddock	51.5(?)	64.5	68	50.5	52.7	Do.
86.	Sept. 6	4	do	Cod	51.5(?)	64.5	68	51	55	Do.
87.	Sept. 22	3	8 feet	Tinker	60	60	63	60.5	63.2	Temperature taken in neighborhood of liver.
88.	Sept. 22	3	do	Pollack, young	60	60	62	60.5	63	Do.
89.	Sept. 22	3	do	Tinker	60	60	63	60.5	63	Do.
90.	Sept. 22	3	do	do	60	60	63	60.5	63.2	Do.
91.	Sept. 22	3	do	Pollack, young	60	60	62	60.5	62	Do.
92.	Sept. 22	3	do	do	60	60	63	60.5	62	Do.
93.	Sept. 22	3	do	do	60	60	63	60.5	62.8	Do.
94.	Sept. 22	3	do	do	60	60	63	60.5	63	Do.
95.	Sept. 22	3	do	do	60	60	63	60.5	43.7	Do.
96.	Sept. 22	3	do	do	60	60	63	60.5	63.2	Do.
97.	Sept. 22	3	do	Sculpin	60	60	60.8	60.8	60.8	Do.

PREVIOUS INVESTIGATIONS.

Dr. John Davy, in a paper read before the Royal Society, in 1835, on the temperature of some fishes allied to the mackerel, observed that the bonito had a temperature of 90° F. when the surrounding medium was 80.5°; and that it therefore constituted an exception to the generally-received rule that fishes are universally cold-blooded.

*Yarrell says: "The consumption of oxygen, however, is small; and the temperature of the body of fishes that swim near the bottom, and are known to possess but a low degree of respiration, is seldom more than two or three degrees higher than the temperature of the water at its surface." This statement, does not appear to be founded upon actual observation, since the temperature of a bottom-feeding fish taken from water at any considerable depth might be, and usually is, much below that of the surface water, and still considerably above the temperature of the water inhabited by the fish. Thus, in the waters about Provincetown, the difference between the bottom and surface water temperatures at 20 fathoms is frequently as great as 30° F. At the time of Yarrell's writing but little was known of the temperature of the water at considerable depths, the deep-sea thermometer being an instrument of comparatively recent use. The quotation illustrates sufficiently well the mistaken theory which underlies the universal belief in the cold-bloodedness of fishes, and which looks to the consumption of oxygen only for the source of animal heat. As has already been shown, whatever heat is developed by this process in fishes is quite lost to its body temperature by the contact of water with the aerated blood in the gills.

The attention of this excellent observer (Yarrell) was strongly attracted to the question of the animal heat of fishes, and he has collected a large number of quotations bearing upon the adaptive power of fishes to extremes of heat and cold, which will be referred to later on. He attached a great deal of importance to the correlation of muscular irritability and "quantity of respiration" in this connection, upon which subject he says:† "Physiologists have shown that the quantity of respiration is inversely as the degree of muscular irritability. It may be considered as a law that those fish which swim near the surface of the water have a higher standard of respiration, a low degree of muscular irritability, great necessity for oxygen, die soon, almost immediately when taken out of the water, and have flesh prone to rapid decomposition. Mackerel, salmon, trout, and herring are examples. On the contrary, those fish which live near the bottom of the water have a low standard of respiration, a high degree of muscular irritability and less necessity for oxygen; they sustain life long after they are taken out of the water, and their flesh remains good for several days. Carp, (cod?), tench, eels, the different sorts of skate, and all the flat fish may be quoted." As against

*History of British Fishes. London, John Van Vorst, 1841. Introduction, p. xx.

†Yarrell, *op. cit.* pp. xv and xvi.

the above statement respecting the speedy death of surface swimmers is the fact observed by myself, that a blue-fish (*Pomatomus saltatrix* (Linn.) Gill), taken August 5, showed distinct signs of life after fifteen minutes spent upon the deck of the yacht, and that a fragment comprising rather more than half the heart continued to pulsate for eight minutes after being separated from the body, and to respond to artificial stimulus for fifteen minutes longer.

Prof. G. Brown Goode, of the Fish Commission, has been engaged for some years in the investigation of the relations of our Atlantic fishes to water temperatures. Last year (1878) he made several direct experiments upon body temperatures, testing the temperature of the rectum with a thermometer and comparing it with that of the water as indicated by a deep-sea (Miller-Casella) thermometer. The experiments were made upon cod and haddock for the most part, and the differences between the rectum of the fish and the water from which it had been taken were found to be inconsiderable, rarely exceeding one degree Fahrenheit, as was the case in the similar experiments made by myself last summer. In the cursory examination which I have made of the literature of the subject I have found no other records of exact experiments upon the animal heat of fishes.

There seems to be, however, no lack of authority for the general belief that these animals are cold-blooded, in the sense that they take on the temperature of the medium which surrounds them, and have not, like the higher vertebrates, a limited normal range of temperature, beyond which life cannot be long sustained. Professor Owen lends the weight of his great name to this opinion (in his general division of vertebrates into *Hæmatotherma* and *Hæmatoecrya*), and the instances which I now quote of the endurance by fishes of extremes of heat and cold without apparent injury are sufficient to establish incontestably the fact that they do possess such endurance to a remarkable degree. The earlier citations are taken at second-hand from Yarrell (Introduction to History of British Fishes).

* Mr. Jesse (*Gleanings in Natural History*, 2d series, p. 277) tells of a friend who saw a goldfish which had been frozen into a block of ice, and afterwards thawed into life.

* Dr. Richardson relates that the gray sucking carp, common in the fur countries of Arctic America, may be frozen and thawed out again without injury. (*Fauna Boreali Americana*, vol. 3.)

* Perch have been frozen and transported for miles, returning to life when thawed (T. S. Buchanan, *Introduction to the Study of Nature*); and John Hunter says (*Animal Economy*): "that these (fishes) after being frozen still retain so much of life as when thawed to resume their vital actions, is a fact so well attested that we are bound to believe it."

† Mr. J. W. Milner (Assistant Fish Commissioner), had a mud minnow

* Quoted by Yarrell, *loc. cit.*

† Goode *On the Migration of Fishes*. Read before the American Fish Cultural Association, February 28, 1878.

(*Umbra limi* [Kirt.] Günther) which was frozen within solid ice in an aquarium-globe, three or four times, and each time regained its vitality upon being thawed out. Instances similar to the foregoing can be adduced indefinitely.

*The only *hybernation* which is definitely known to occur among fishes, says Professor Goode, takes place in the fresh-water lakes and streams of cold regions. The fishes are driven by cold into the deeper waters, and there remain in a state of torpor, proportional in degree to the amount of cold which they experience. Hybernation does not appear to be in any case a voluntary act. The fishes do not become torpid of their own accord. They avoid it as long as they can, and only succumb when they are deprived of the means of escape. They never become torpid when there are greater depths to which they can retreat.

†Dr. C. C. Abbott reports of the fresh-water mullet (*Myxostoma oblongum*): "No degree of cold seems to affect the movements of this species, and hundreds can frequently be seen under the ice, moving slowly along the bed of the stream, feeding upon the wilted remnants of pond-lily and splatter-dock plants. * * * This applies also to our common roach (*Stilbe americana*), which, to a less extent, braves the chilling waters of our streams throughout the winter, and, in consequence, suffers from the persecutions of the three species of pike (*Esox reticulatus, fasciatus, porosus*) inhabiting our streams."

‡See also Mr. Rudolph Hessel's observations upon the winter torpor of the carp. This appears to be a true hybernation, during which, although the fish takes no food in some climates from October until March, there is no diminution in weight.

On the other hand, fishes have been reported as living and thriving in water at an exceedingly high temperature; high enough to produce death by coagulation of the albumen in their blood and tissues, unless there is some provision by which their interior parts are maintained at a temperature lower than that of the surrounding water. As the existence of any protection analogous to that afforded to mammals by the function of perspiration and evaporation seems obviously impossible to animals living in the water, it is difficult to understand in what way such a reduction in temperature can be produced and kept up.

§Thus, Humboldt and Bonpland observed living fishes in hot water thrown up from a volcano and showing a temperature of 210° F.

§Desfontaines found a *Chromis* in the hot springs of Cafsa, in Bombay, the water in which showed 30° R. (97.5° F.), and Shaw afterwards saw small mullet and perch in the same springs. (*Travels in Bombay*, folio, Oxon. 1738, p. 231.)

* Goode, *loc. cit.*

† Notes on some Fishes of the Delaware River. United States Fish Commissioner's Report for 1875-76, p. 825.

‡ The Carp and its Culture. Fish Commissioner's Report for 1875-76, p. 869.

§ Quoted by Yarrell, *loc. cit.*

* Saussure saw eels, rotifera, and infusoria in hot springs of Aise, in Saxony, in 1790, at a temperature of 113° F.

* Bruce says that at Feriana, the ancient Thala, are springs of warm water without the town, where he saw small fishes, 4 inches long, not unlike gudgeons. The temperature is not noted, but he says: "Upon trying the heat by the thermometer I remember to have been much surprised that they could have existed, and even not been boiled, by continuing so long in the heat of this medium."

* Facts mentioned by Somerset induced Broussonnet to make some experiments on the degree of heat which river fish are capable of enduring. Details of the degrees of heat are not stated, but many species lived several days in water too hot for the hand. (This and the preceding citation from Dr. Hodgkin's additions to the translation of Dr. W. F. Edwards' work "On the Influence of Physical Agents on Life.")

† Professor Goode writes: "In warm countries an analogous phenomenon (to hybernation) takes place, which has been called *æstivation*. When the lakes and streams are dried up by the heat, the fish seek refuge in the deepest pools, and when they too are dried, they bury themselves in the mud at the bottom and remain torpid until the rainy season refills the reservoirs and revives them."

‡ Day reports that on January 18, 1869, he visited a large tank which was then almost dry, having only about four inches of water in the center, while the circumference was hard enough to walk on. The soil was a thick and tenacious bluish clay, from which, fully thirty paces from the water and two feet below the surface, were taken five living fishes. Two were *Ophiocephalus punctatus*, and three were *Rhincobdella aculeata*. They were covered with a thick adherent slime. "All were lively and not in the least torpid." Day also reports *Amphipnous cuchia* as having been dug up under similar circumstances. Mr. Whiting, chief officer of the western province of Ceylon, informed Sir Emerson Tennent that he had been twice present when the peasants had been digging up fish of nine to twelve inches long, full-grown and healthy, which *jumped on the bank* when exposed to the light.

Batrachians, tortoises, and land-snails are commonly found in a torpid state during the hot and dry months, a state which may truly be called *æstivation*, but which differs decidedly from the condition of activity described above as observed in buried fishes, and for which there is no very obvious explanation.

The instances cited are sufficient to show that the popular belief that fishes possess no animal heat of their own rests upon well-attested observations. At first sight it is difficult to understand otherwise how these animals can undergo the extremes of heat and cold which they have been known to undergo and continue to live. Yet, when the adaptability of birds and mammals, whose normal range of body temperature is so extremely narrow compared with that of fishes, to extremes

* Quoted by Yarrell, *loc. cit.*

† Goode, *op. cit.*

‡ "Fresh Water Fishes of India," p. 28.

of heat and cold is fairly considered, the necessity for this inference seems to be not so very obvious. And no one appears to have tried the experiment of subjecting the *same individuals* to great differences of temperature, whereby the immense effect of inherited adaptation would have been thrown out of the account.

With the exception of the often-quoted paragraph from Humboldt and Bonpland, none of the foregoing observations attest a higher temperature than 113° F., noted by Saussure as endured by eels in the hot springs of Aise. This is but little above the temperature observed at Fort Yuma, in California, which is occupied as a military post.

I have not yet found the original passage from which the statement credited to Humboldt and Bonpland, as to living fish in water at a temperature of 210° Fahr., is quoted. Yarrell gives no indication of the precise place from which he cites. In an essay* "*Sur une nouvelle espèce de pimelodus*" (*P. cyclopus*), however, Humboldt writes: "L'hasard a voulu que ces inondations volcaniques n'eussent pas lieu l'année que j'ai passée dans les Andes de Quito; mais les poissons vomis par les volcans sont un phénomène si commun et si généralement connu de tous les habitants de ce pays, qu'il ne peut pas rester le moindre doute sur son authenticité." From which it appears that, on the occasion referred to at least, he was obliged to rely upon second-hand testimony; especially upon that of M. de Larrea, of Quito, who had collected a cabinet of minerals, was instructed in chemistry, and had looked into the records of many villages around Cotopaxi. From this gentleman he learned that in 1691 myriads of the fishes in question were vomited up from the volcano of Imbabarri, causing a fever among the neighboring people. Some Indians assured him ("quelques Indiens m'ont assuré") that the fishes were living as they came down the side of the mountain, "*mais ce fait ne me paroît assez avéré.*" Very few of the specimens that he saw were sufficiently disfigured, in his opinion, to indicate exposure to very great heat, and the specimens came out of the mountain mixed with an argillaceous mud. Humboldt conjectures the existence of subterranean lakes whence he supposes the fishes to have come. Not having found the original passage, I cannot, of course, say how far its context might modify the inferences which have been drawn from it as quoted, but it is evident that at the time here referred to, at least, he had no idea that the fishes were alive when thrown out from the mountain, nor did he make any record of the temperature (210° Fahr.) named in the citation.

The instances of frozen fishes thawed into life again differ in kind rather than in degree from familiar experiences with frozen fingers, toes, and ears restored to their integrity by gradual thawing, *when they have not been frozen too long.* In no case, so far as I know, has any attempt been made to ascertain whether the frozen fish retains in its interior parts a temperature above the freezing-point; nor is it stated that

* *Recueil d'observations de zoologie et d'anatomie comparée*, Paris, 1811, tome 1^{er}, p. 22.

fishes have been thawed into life after having been frozen for any great length of time.

* Dr. Richardson's remarks in a recent communication to *Nature*, upon "Suspended Animation," are pertinent to this inquiry. "It is hard to say whether an animal, like a fish, frozen equally through all its structure, is actually dead in the strict sense of the word, seeing that if it be equally and uniformly thawed it may recover from a perfect glacial state. In like manner it may be doubted whether a healthy, warm-blooded animal suddenly and equally frozen through all its parts is dead, although it is not recoverable, because in the very act of trying to restore it some inequality in the direction is almost certain to determine a fatal issue, owing to the transition of some vital centre into the pectous state of colloidal matter. I do not, consequently, see that cold can be of itself and alone utilized for maintaining suspended animation in the larger warm-blooded animals of full growth. * * * It is worthy of note that cold is antiseptic, as though whatever suspended living action, suspended also by some necessity or correlative influence the process of putrefactive decay."

Respectfully submitted.

J. H. KIDDER.

Hon. SPENCER F. BAIRD,

United States Commissioner of Fish

and Fisheries, Washington, D. C.

FEBRUARY 10, 1880.

DESCRIPTIONS OF NEW GENERA AND SPECIES OF FISHES FROM THE COAST OF CALIFORNIA.

By W. N. LOCKINGTON.

1. *Leurynnis paucidens*, gen. et sp. nov.

GENERIC CHARACTERS.—Family *Zoareidæ*, allied to *Lycodes*. Ventral fins present, short; no teeth on vomer and palatines; dorsal and anal fins continued without interruption around the tail. Scales small, but evident. The name is from *λεπρος*—smooth; *ὄνυξ*—vomer, in allusion to the character which chiefly distinguishes the genus from *Lycodes*.

SPECIFIC CHARACTERS.—Body elongate, eel-like; extremity of snout subtruncate; profile of remainder of snout and head conic, slightly convex over the eyes; highest part of the dorsal outline and deepest part of the fish perpendicular to a point about midway between the posterior end of the lower jaw and the base of the pectoral; from this point to the slightly rounded end of the caudal the body tapers regularly both above and below. Head broad, the sides (viewed from above) almost straight from the opercula to about half-way between the eye and the tip of the snout, thence rapidly approaching and meeting in an obtuse point.

Greatest depth of body from a little more than ten to a little less than eleven times: length of head $4\frac{1}{3}$ — $4\frac{2}{3}$ times in the total length; snout $2\frac{1}{3}$

* Quoted from *Forest and Stream*, September 4, 1879.

—3 times; eye $5\frac{2}{5}$ — $6\frac{1}{4}$ times in the length of the head; lower jaw $1\frac{1}{8}$ — $1\frac{3}{4}$ of the head. Pectoral fin $\frac{9}{22}$ — $\frac{1}{2}$ the length of the head, and $4\frac{1}{2}$ to almost 6 times the length of the ventrals; anus situated at the end of the second fifth of the total length.

Nostrils much nearer to the extremity of the snout than to the eye and below the horizon of the lower margin of the orbit; provided with a short tube.

Eyes elliptical, directed obliquely upwards and outwards; the interocular space only about $\frac{1}{6}$ of the total width of the head, the sides of which continue to shelve outwards at the same angle with the eye-balls as far as the lower margin of the suborbital ring. Interorbital space concave to about the center of the orbit, at which point the two ridges bordering the eyes unite with the central ridge, separating again posteriorly.

Mouth large, slightly oblique, the cleft straight, its angle reaching about to a vertical from the center of the pupil; intermaxillaries and maxillaries very slender; lower jaw received within the upper; lower margin of mandible straight, with a small symphysial knob, and a prominent articulation. In the females the mouth is smaller; maxillary with its posterior extremity enveloped in the skin of the angle of the mouth. Tongue large and thick.

Teeth small, slender, bluntly pointed, those of the mandible in about four irregular rows in front, those of the inner row largest and farthest apart. The outer row disappears at about $\frac{1}{4}$ of the length of the cleft of the mouth from the tip of the mandible, but the inner row continues to about $\frac{1}{2}$ the length of the cleft of the mouth. The outer row slopes outward, but the inner is much recurved, and the three or four posterior teeth of the inner row on each side are the largest and strongest in the jaws. Teeth of the intermaxillary in a single row, extending about half-way along the sides of the mouth, the largest in front, gradually diminishing posteriorly. No vomerine or palatine teeth.

Gill-openings narrow, inclined forwards, and broadly attached to the isthmus; branchiostegals six, sometimes only five. Pseudobranchiæ. Operculum very small, with radiating ridges; cheeks fleshy, very long, so that the eye is nearly midway between front of opercle and tip of snout. Upper and lower pharyngeal bones covered with villiform teeth; the posterior upper pharyngeal smallest; the lower pharyngeals separate, subtriangular. Gill-rakers quite short, pointed, flexible.

Vertical fins continuous, long and low, and formed of soft rays throughout, dorsal commencing at a vertical from a little before the center of the length of the pectoral, caudal somewhat rounded, anal commencing very near to the anus. Dorsal with about 90 rays; anal with about 70.

Ventrals very small, jugular, consisting of two rays; their insertion slightly posterior to the lower extremity of the branchial opening.

Upper axil of pectorals below the center of the height of the body,

their base vertical, and extending to the abdominal outline; the fin consisting of 18 rays, the fifth or sixth longest, the lowest about $\frac{2}{3}$ as long as the fifth; first three or four rays simple, the others bifurcate.

No lateral line. Scales roundish, smooth, separate, embedded in the skin, uniform over the whole of the body, except upon an area on the upper surface in front of the dorsal, where they are smaller, and region near base of pectorals scaleless. Head scaleless, the ridges somewhat prominent.

Color olivaceous, the scales lighter than the skin; the color formed by numerous dark points, which are continued also upon the head. Upper surface of head darker, abdominal surface lighter than other portions. Vertical fins margined with black.

This species is not uncommon in the markets at San Francisco. Two specimens, 10 to 12 inches in length, have been forwarded to the United States National Museum, where they are numbered 23502. They may be considered as the types of the species.

2. *Odontopyxis trispinosus*, gen. and sp. nov.

GENERIC CHARACTERS.—Family *Agonidae*, allied to *Agonus* (*cataphractus*), from which it differs chiefly in the presence of teeth on the vomer and palatines. It is distinguished from *Agonopsis*, Gill, by its smaller fins and slenderer form.

SPECIFIC CHARACTERS.—Body octahedral, the lower flat side terminating behind the anal fin, the upper side a little behind the second dorsal. Posterior portion of body hexagonal. Body anteriorly very much broader than deep, the upper side, from the head to its termination, concave; lower side slightly concave; the other surfaces flat. Lateral surfaces (traversed by the lateral line) wider anteriorly than those separating them from the upper and lower surfaces; posterior to the second dorsal the lateral surfaces are narrowest.

Greatest depth, above pectoral, 10–12 times in length; greatest width, at gill-covers, $7\frac{5}{8}$ –8; length of head, $5\frac{2}{5}$ – $5\frac{4}{5}$ times in the total length; eye, $3\frac{1}{2}$ – $3\frac{4}{5}$; snout, $3\frac{1}{2}$ – $3\frac{4}{5}$; interorbital width, $6\frac{1}{3}$ –7 times in length of head.

Head triangular, depressed. A sharp, rather long, movable spine upon the tip of the snout, its triangular base projecting beyond the jaws; behind this central spine, on the highest point of the snout, is a pair of similar, but recurved, fixed spines. Snout posterior to these spines nearly level to orbital region. A prominent supra-orbital ridge ending posteriorly in a backward-directed spine. Forehead strongly convex longitudinally, and strongly concave transversely. Occiput slightly depressed between the par-occipital ridges, its posterior border deeply emarginated. Supra-occipital ridge but slightly marked above, but very conspicuous on the hinder margin of the head, where there is a deep cavity in front of the first series of body-plates, this cavity longitudinally divided by the supra-occipital ridge. A slightly-marked ridge from the center of the hinder margin of the eye to the lateral keel of

the upper surface. A backward-directed spine on each pre-orbital. Nostrils in a depression on each side of the snout. Lower jaw received within the upper both on front and sides. Jaws, vomer, and palatines armed with minute, sharp, closely set teeth.

Maxillary almost entirely concealed by the free edge of the pre-orbital when the mouth is closed. Two minute barbels at each angle of mouth. Orbit large, almost circular, occupying far the larger portion of the height of the head, the upper margin of the pupil touching a line drawn from the upper part of the snout to the occiput.

Gill-membranes attached to a broad isthmus; branchiostegals seven.

Pectoral shorter than head, broadly rounded on lower margin, and composed of fourteen simple rays.

Ventrals inserted posterior to the insertion of the pectorals, close together, consisting of a spine and two unbranched rays.

Vent a conspicuous elliptical opening, situated at about the middle of the length of the ventrals.

First dorsal of four spines, the second longest, the fourth shortest, the third slightly longer than the first; its base occupying the posterior portion of the seventh, and the whole of the eighth and ninth series of plates.

Second dorsal of six unbranched rays, the second slightly longer than the first; its base occupying the fifteenth to the nineteenth series of plates, inclusive.

Anal of six rays, opposite and similar to the soft dorsal.

Caudal elongate, rounded on posterior margin, and consisting of eleven unbranched rays. Fin-membranes delicate.

Thirty-five to thirty-seven series of plates from occiput to base of caudal, each series strongly keeled, each keel ending in a spine; a circle of horizontal spines around the base of the caudal. The two elongate, subrectangular shields at the base of the ventrals are in the line of the second series of dorsal plates, the first series terminating above the pectorals. Twenty-seven irregular plates on the under surface of the body in front of the ventral plates. Lateral line simple, along the center of the lateral surfaces.

Color olivaceous or yellowish, with six or seven darker bands of brown on the dorsal surfaces. Under side uniform whitish. Fins blotched with blackish.

Three specimens of this species are known to me; two of them were obtained in the markets of San Francisco. One of these, which may be considered as the type of the species, has been forwarded to the United States National Museum, and is numbered 23504 on the Museum Register. The third specimen was procured on the coast of Alaska by the United States Coast Survey. The aspect of this fish is that of *Agonus*, but the presence of teeth on the vomer and palatines excludes it from that genus.

Dimensions.

	No. 1.	No. 2.
Total length	2.95	3.23
Length of head to gill-opening .....	.38	.56
Length of head to center of occipital emargination .....	.33	.48
Width at gill-openings (greatest width) .....	.27	.405
Greatest depth .....	.205	.27
Tip of snout to pectoral base .....	.40	.62
Tip of snout to ventral base .....	.46	.75
Tip of snout to origin of 1st dorsal .....	.65	1.03
Tip of snout to origin of 2d dorsal .....	.94	1.50
Tip of snout to origin of anal .....	.94	1.50
Tip of snout to anterior margin of vent .....	.53	.82
Length of snout .....	.10	.16
Longitudinal diameter of orbit .....	.10	.16
Interocular width .....	.06	.08
Length of gape of mouth .....	.08	.12
Length of pectoral .....	.31	.52
Length of ventral .....	.13	.24
Height of longest (2d) spine of 1st dorsal .....	...	.29
Height of longest (2d) ray of 2d dorsal .....	...	.32
Height of longest ray of anal .....	...	.26
Number of series of plates (on back) and of tubes of lateral line	35	37
Fin-formula: B. 7; P. 14; VI, 2; D. 1V-6; A. 6; C. 11.		
The dimensions are all taken along the axis of the fish.		

3. *Artedius quadriseriatus*, sp. nov.

B. 5; D. $\frac{IX-X}{14}$; A. 12; P. 16; V. 4; C. 2, 11, 2; Lat. line 35-37.

Snout straight, rising at an angle of about 45°, forehead strongly curved, occipital region slightly concave, depth of body at origin of dorsal only slightly exceeding that at posterior margin of orbit. A conspicuous supra-orbital barbel about half as long as diameter of eye. Dorsal outline from origin of dorsal to caudal peduncle straight and deflected regularly downwards.

Gape of mouth very slightly oblique, rest of abdominal profile straight. Greatest width (at preopercles) $6\frac{4}{11}$ to nearly 7, greatest depth (at origin of dorsal) about equal to greatest width; length of head (to tip of operculum) $2\frac{2}{3}$ times, in total length to end of caudal. Snout about equal to longitudinal diameter of orbit which is about $3\frac{2}{3}$ times in head; interocular width $12\frac{1}{2}$ - $14\frac{1}{2}$ times in length of head. Depth of caudal peduncle $3\frac{1}{2}$ times in greatest length, pectoral about $1\frac{1}{2}$ in length of head.

Head large, deep; ascending processes of premaxillaries forming two converging ridges, ending above in a blunt projection, on each side of which, in a line with the nostrils, is a long sharp spine. A pair of spines on occiput, the interval between them concave transversely. A transverse sulcus between the anterior pair of spines and the forehead.

Eyes directed obliquely upwards, interocular space concave, narrow, less than $\frac{1}{3}$ the width of the eye.

Gape of mouth slightly oblique, maxillary reaching to the middle of the pupil, its end with a slender barbel; mandible straight; jaws even when the mouth is closed.

A band of closely set, sharp, nearly straight, cardiform teeth in both jaws, the largest teeth in the front of the jaws, where there are more rows than at the sides. Similar teeth on vomer and palatines. Cushions of villiform teeth on pharyngeals.

Gill-rakers tubercular; branchiostegals five, gill-membranes broadly connected below the throat; no isthmus. Pseudobranchiæ present.

Preoperculum with a large process which has four curved spines above and ends in a spine directed backwards. Sometimes there is a fifth spine on the upper margin, or the tip is bifid. Three other preopercular spines, the uppermost a little below the spine-bearing process, and directed backwards, the next pointing downwards, the lowest obliquely forwards, the three last equidistant. Supra-scapula with a ridge, in a line with the first scale of the lateral line. Upper surface and sides of the head with numerous pores, the most conspicuous of which are on the anterior portion of the forehead. Top and sides of head with some minute, smooth, imbedded scales. Opercle small, ending posteriorly in a flat, bluntish spine, behind which is a large membranous flap.

First five spines of first dorsal sub-equal, the others diminishing rapidly, last very short. Two dorsals entirely separate, interval short.

Second dorsal increasing in height to fourth or fifth ray, first ray about $\frac{3}{4}$ as long as second. From the longest ray the upper margin inclines regularly to the last (14th), which is about $\frac{1}{2}$ the length of the longest.

Anal similar to soft dorsal, but the rays shorter, fourth ray longest. Origin of 1st dorsal opposite the center of the supra-scapular ridge, that of 2d opposite the 11th scale of the lateral line, anal arising opposite the 2d, and terminating opposite the 13th ray of the 2d dorsal.

Pectoral base oblique, broad, pectoral broadly lanceolate, 5th ray longest and extending back to the 2nd ray of the 2d dorsal.

Ventrals small, four-rayed, inserted slightly behind the posterior axil of the pectoral base; length to that of pectoral as 3.8. All fin-rays unbranched.

Each side of the body with two bands of large, strongly ctenoid scales; the lower bearing the lateral line, composed of 35 to 37 scales, beginning at the upper angle of the gill-openings, thence strongly decurved over the pectorals, thence running straight to the base of the caudal. Many of the scales on the posterior part of this band are provided with slender cirri. The upper band of scales begins further back, in front of the middle of the dorsal, and runs along the base of the dorsal fins, stopping before reaching the caudal. This band is composed of two series of alternating scales, closely wedged in together. Between and above these bands are a few small scattered imbedded scales. Like the scales on the head these small scales can only be seen with the aid of a magnifying-glass.

Color olivaceous, with darker spots formed of black punctulations; four or five dark blotches along the lateral line. Branchiostegal mem-

brane sometimes black. Two black spots on the spinous dorsal, one in front, the other at the tips of the posterior rays. Other fins olivaceous.

Pectorals and caudal barred; ventrals and anal sometimes black, sometimes colorless. Under surface creamy-white.

Several specimens obtained in San Francisco market among heaps of *Pandalus Danae*. Two of these now in the United States Museum are numbered 23503 on the register.

As the specimens obtained vary less than is the case with many species, and are of very nearly the same dimensions, I subjoin measurements of two only.

The principal variations are in the height of the dorsals and in the color of the paired fins and of the anal, which are much darker in some than in others. The dimensions are all axial, unless otherwise stated.

	Inches.	Inches.
Total length, to tip of caudal.....	3.38	3.50
Total length, without caudal.....	2.80	2.90
Length of head, to tip of operculum.....	.95	.99
Greatest depth of body at origin of 1st dorsal.....	.47	.55
Greatest width at preopercles.....	.49	.55
Depth of caudal peduncle.....	.14	.16
Tip of snout to insertion of ventrals.....	.75	.82
Tip of snout to origin of 1st dorsal.....	.80	.83
Tip of snout to origin of 1st dorsal along dorsal outline.....	.90	.95
Tip of snout to origin of 2nd dorsal.....	1.44	1.54
Tip of snout to origin of anal.....	1.46	1.56
Height of longest ray of 1st dorsal.....	.46	.41
Height of longest ray of 2nd dorsal.....	.45	....
Length of base of 1st dorsal.....	.56	.58
Length of base of 2nd dorsal.....	.85	.85
Length of base of anal.....	.68	.68
Width of pectoral base.....	.28	.30
Length of pectoral, from center of base.....	.80	.80
Length of ventrals.....	.31	.31
Longitudinal diameter of orbit.....	.26	.26
Length of snout.....	.24	.26
Interocular width.....	.065	.08
Tip of snout to end of maxillary.....	.31	.32
Length of preopercular process.....	.21	.22

SAN FRANCISCO, December, 1879.

CATALOGUE OF A COLLECTION OF FISHES OBTAINED IN THE GULF OF MEXICO, BY DR. J. W. VELIE, WITH DESCRIPTIONS OF SEVEN NEW SPECIES.

By G. BROWN GOODE and TARLETON H. BEAN.

MALTHEIDÆ.

1. *Halieutichthys aculeatus* (Mitchill), Goode.

Lophius aculeatus, MITCHILL. Amer. Monthly Mag. II, 1878, p. 325 (Straits of Bahama).

Halieutichthys reticulatus, POEY. Proc. Acad. Nat. Sci., Phil., 1863, p. 91 (Cuba).

Halieutichthys aculeatus, GOODE. Proc. U. S. N. M., II, 1879, p. 109 (calling attention to Mitchill's description).

A single specimen, No. 23552, 5 centimeters long, was collected by Dr. Velie, at Key West.

DIODONTIDÆ.

2. *Chilomycterus geometricus* (Linn.), Kaup.

Two specimens (No. 23542) collected at Key West. They belong to Günther's var. *a*, but are much lighter than any specimens among the hundreds we have seen from the North Atlantic coast, the width of the brown longitudinal stripes being comparatively small in relation to those of light color.

OSTRACIONTIDÆ.

3. *Ostracion trigonus*, LINNÆUS.—*Shell-fish*.

A single specimen in salt (No. 23645) from the west coast of the peninsula.

BALISTIDÆ.

4. *Monacanthus occidentalis*, Günther.

A single specimen (No. 23551), 63 millimeters long, from Key West. The specimen has the scales upon the posterior portion of the body hispidate, also a pair of strong recurved spines on each side of the caudal peduncle. Four indistinct longitudinal brown bands upon the side, and a fifth much deeper in color at the base of the ventral flap, triangular in form, the base of the triangle extending from base of the ventral spine to the vent. The outer half of the ventral flap is white with a submarginal stripe and three or four lines of ocellæ of light brownish gray.

D. 30, A. 30.

SYNGNATHIDÆ.

5. ? *Syngnathus louisianæ*, Günther.

A single specimen (No. 23549), 64 millimeters long, was collected by Dr. Velie at San Marco Island, Florida.

D. 32 (?). Osseous rings 17 + 32.

The specimen corresponds closely with Günther's description. Its principal points of distinction from *S. fuscus* are the low, somewhat short dorsal fin and the short snout.

BATRACHIDÆ.

6. *Batrachus tau*, Linnaeus, *subsp. beta*, Günther.

A specimen (No. 23541), 22 centimeters long, was collected by Dr. Velie at Punta Russa, the most southern locality on record for this species.*

This fish, like all other Gulf of Mexico specimens inspected by us, agrees closely with var. β , as defined by Günther,† in the tendency to expansion of the dark areas; the presence of small whitish spots upon the body; the greater average number of bands on the anal, approximating in number those of the dorsal, and the marking of the pectorals and caudal in white spots upon dark ground, rather than in brown upon white. The coloration of the southern specimens appears to be due to a tendency toward melanism, the dark areas being intensified as well as expanded. In the Punta Russa specimen (No. 23541) the main color is nearly black, the lines and marblings being of light shades of brown and brownish white, sharply and beautifully defined against the dark body-color. In the Pensacola specimen, No. 21477, the melanistic tendency is less evident. We consider the Gulf specimens as, for the present, constituting a distinct subspecies, founded entirely upon color.

Radial formula of No. 23541, D. III, 24. A. II, 19. The first and second dorsal fins are continuous in 23541, but this is evidently accidental.

That the number of bands on the fins and their tendency to confluence is a character of little importance is shown in the following color notes: No. 4637 *a*. Beesley's Point. S. F. Baird.

Light brown, finely marbled with darker, and not white spotted (*a* and *b*). Dorsal with eight bands. Anal with seven bands. Caudal with six bands. Pectorals irregularly brown spotted.

4637 *b*. Beesley's Point. S. F. Baird.

Light brown, coarsely marbled with darker. Dorsal with six bands, anal with six bands, caudal with four bands, pectorals with the brown spots arranged in four bands.

* The National Museum has a specimen from Pensacola, Fla., collected by Silas Stearns in 1878 (No. 21477): another from West Florida, collected by Kaiser and Martin (No. 5149), and two collected at Indianola, Tex., by J. H. Clark (No. 746). No species of *Batrachus* is now recognized from the eastern coast of South America, though it seems certain that some species, closely allied to *B. tau*, or perhaps even this very species, occurs in Brazil. Compare *Batrachus Gronovii*, CUV. & VAL., Hist. Nat. Poiss., xii, 1837, p. 482.—*Batrachus cryptocentrus*, CUV. & VAL., l. c., p. 485, from Bahia, rejected by Günther as incompletely described.

† Cat. Fish Brit. Mus., iii, 1861, p. 167.

4637 *c.* Beesley's Point. S. F. Baird.

Dorsal with eight, anal with seven, caudal with five, pectoral with five bands.

4637 *d.* Beesley's Point. S. F. Baird.

Dorsal with eight, anal with six, caudal with four, pectoral with spots arranged in irregular, almost complete, bands.

4637 *e.*

Dorsal with nine bands, the second and third and sixth and seventh confluent. Anal with nine bands. Pectoral with irregularly arranged quadrangular spots of brown and white, in a sort of checkerboard arrangement.

3441. Norfolk, Va. Dr. Jeffries.

Body as usual. Dorsal with seven, anal with eight, caudal with four bands. Pectorals irregularly spotted with brown, arranged approximately in five bands.

23541. Punta Russa, Fla. Dr. J. W. Velie.

Body brown, marbled with very dark brown, and spotted with whitish. Dorsal with nine very regular blackish bands of uniform width, sharply separated by white. Anal with nine regular bands. Caudal with five. Pectoral brownish black dotted with white.

20632. Wood's Holl, Mass. U. S. F. C.

Young specimen. White, with sides coarsely reticulated with brown. Dorsal with seven irregular confluent bands. Anal with nine irregular bands. Caudal irregularly marbled with broad penciling of brown. Pectoral with three or four very irregular lines of brown blotches.

D 26. A 21.

Others in the same bottle correspond in markings and radial formulæ.

746. Indianola, Texas. J. H. Clark.

Faded alcoholic specimens show a general agreement with the other Gulf specimens in the presence of seven to nine bands in both dorsal and anal, and in the white spots on pectoral and caudal.

D. III. 25; A. 20 (in two specimens).

21477. Pensacola, Fla. Silas Stearns.

Body nearly black, but agreeing in general with the descriptions, and with tendency to white maculation on body, pectoral, and caudal. Three bands on dorsal, eight on anal, not clearly separated as in the Key West specimen.

Table of measurements.

Batrachus tau, subsp. *beta*.

Current number of specimen.....	21477	
Locality	Pensacola, Fla.	
	Millime- ters.	100ths of length.
Extreme length.....	242	
Length to origin of middle caudal rays.....	205	
Head:		
Greatest length, obliquely to gill-opening		42
Greatest width		29½
Width of interorbital bone		4
Length of snout (oblique).....		8
Length of operculum to end of longest spine.....		8
Length of upper jaw.....		20½
Length of mandible.....		26
Diameter of orbit.....		5
Dorsal (spinous):		
Distance from snout		37
Length of base.....		9
Height at first spine.....		3½
Height at second spine.....		6
Dorsal (soft):		
Length of base.....		53
Anal:		
Distance from snout		60
Length of base.....		42
Caudal:		
Length of middle rays		18
Pectoral:		
Distance from snout		41
Length (without peduncle).....		16
Ventral:		
Distance from snout.....		31
Length.....		17½
Dorsal.....	III, 24	
Anal.....	22	
Pectoral.....	18	
Ventral.....	I, 2	

7. *Batrachus tau*, subsp. *pardus* Goode & Bean.

Two specimens of a very remarkable form of *Batrachus* were collected in Pensacola in 1878 by Mr. Silas Stearns. They are mentioned on p. 127, in our paper on the fishes of Pensacola, September 19, 1879. Our suspicions as to their specific individuality then expressed have not been confirmed by more careful study. The characters by which they are separated from typical *Batrachus tau* are extremely difficult to define. Yet, unless other specimens are obtained which shall bridge the chasm between the two Pensacola specimens and all others of *B. tau* from Pensacola and elsewhere in the Museum, we cannot but consider them as representing two distinct subspecies. The melanistic tendency of the typical *B. tau* in the South, as observed by Günther and illustrated by all our Gulf specimens, should be taken into consideration, for the types of *B. pardus* are lighter in color than any specimens of *B. tau* in the Museum.

The vertebrae number 12-22 (the modified vertebra at the base of the caudal fin not being included). These fish were called in Pensacola by the names "Sea Robin" and "Sapo"; the latter being doubtless a corruption of the Spanish "Sapo", meaning "toad".

Color.—Body very light yellowish brown, gray beneath, thickly spotted with dark brown. The spots on the head are smaller than those on the body. Those on the under side of the body are numerous, circular, the largest equalling the eye in size. On the upper part of the back are many large oblong blotches of brown, interspersed with numerous smaller circular spots. The markings of the dorsal and anal fins remotely resemble those in *Batrachus tau*, subsp. *a* and *β*. In No. 22337*a* there are nine interrupted bands on the dorsal and six on the anal, two distinct bands on the anterior half of the caudal, and on its posterior half numerous blotches of the body color or dark brown grayish. Pectorals grayish at the base, yellowish brown elsewhere, and thickly blotched with dark brown.

In No. 22337*b* the oblique bands on the dorsal fin are obsolete, replaced by irregular blotches and an irregular marginal band of black. The anal exhibits obsolescent bands, perhaps eight in number. Caudal dark brown with a few light blotches. Pectoral as in 22337*a*, but with a wide brownish black margin.

Table of measurements.

Batrachus tau, subsp. *pardus*.

Current number of specimen	22337 <i>a</i> .		22337 <i>b</i> .	
	Pensacola, Fla.		Pensacola, Fla.	
Locality	Millime- ters.	100ths of length.	Millime- ters.	100ths of length.
Extreme length	379	.....	.....	.....
Length to origin middle caudal rays	320	.....	320	.....
Head:				
Greatest length, obliquely to gill-opening .....	.....	36½	.....	37½
Greatest width .....	.....	31	.....	32
Width of interorbital bone .....	.....	4½	.....	4½
Length of snout (oblique) .....	.....	7½	.....	8
Length of operculum to end of largest spine .....	.....	7	.....	8½
Length of upper jaw .....	.....	18	.....	19½
Length of mandible .....	.....	24	.....	23½
Diameter of orbit .....	.....	5	.....	5
Dorsal (spinous):				
Distance from snout .....	.....	35½	.....	35½
Length of base .....	.....	8½	.....	6½
Length of first spine .....	.....	4½	.....	4
Length of second spine .....	.....	6	.....	5
Dorsal (soft):				
Distance from snout .....	.....	46½	.....	.....
Length of base .....	.....	54	.....	.....
Anal:				
Distance from snout .....	.....	61	.....	63
Length of base .....	.....	38	.....	40
Caudal:				
Length of middle rays .....	.....	18½	.....	.....
Pectoral:				
Distance from snout .....	.....	35½	.....	38
Length (without peduncle) .....	.....	17	.....	16
Ventral:				
Distance from snout .....	.....	23	.....	26
Length .....	.....	18½	.....	21
Dorsal*	III, 26	.....	III, 26	.....
Anal	22	.....	22	.....
Pectoral	21	.....	21	.....
Ventral	I, 2	.....	I, 2	.....

* Fin injured; some of the rays are missing—III, 26 present.

TRIGLIDÆ.

8. *Prionotus punctatus* (Bloch), Cuvier.

A single young specimen (No. 23550), 61 millimeters in length, was collected by Dr. J. W. Velie, at Clear Water Harbor, Fla.

D. X, 13; A. I, 11.

SCORPÆNIDÆ.

9. *Scorpæna* sp.

A small specimen in bad condition (No. 23556), 45 millimeters long, from Clear Water Harbor, Fla. It agrees in most particulars with *Scorpæna plumieri*, Schn., but appears to have much larger scales. The scales are rubbed off from the posterior part of the body, but the indications are that they did not exceed 30 or 35 in number, while *S. plumieri* has 45. The count is not sufficiently certain to be of value, but the occurrence of the genus at this locality should be noted.

D. XI, I, 10; A. III, 5.

LABRIDÆ.

10. *Chærojulis humeralis* (Poey).

A single young specimen (No. 23626), 60 millimeters long, collected at Clear Water Harbor, Fla. It agrees with Poey's type of *Julis humeralis* except in the absence of the nuchal band, the band upon the dorsal fin, and the dark corners of the caudal fin. These may possibly be acquired with age. The three Cuban specimens examined all exceeded 120 millimeters in length.

D. IX, 11; A. III, 12. L. lat. 2 | 27 | 9.

POMACENTRIDÆ.

11. *Pomacentrus leucostictus* M. & T.

Three specimens (No. 23627), 46 millimeters to 55 millimeters long, were collected by Dr. J. W. Velie, at Clear Water Harbor, Fla. The species is a strongly-marked one, and the specimens before us agree in every particular with Dr. Günther's excellent description. They are of the brown type of coloration, and are sufficiently young to show traces of the black ocella on the tail, though the blue ring is not very distinct, and of the convergent blue lines on the snout. Specimens of the same size from the Bermudas show them much more clearly.

D. XII, 15; A. II, 13; L. Lat. 3 | 28 | 9.

12. *Glyphidodon concolor* (Gill), Günther.

A single specimen (No. 23652), 38 millimeters long, was taken at Marquesas Keys, Florida. The radial formula is as follows:

D. XII, 12; A. II, $8\frac{1}{2}$; V. I, 5; Scales $2\frac{1}{2}$ —25— $9\frac{1}{2}$.

There are six dark bands on the body and tail.

CARANGIDÆ.

13. *Oligoplites occidentalis* (Linn.), Gill.—*Herring*.

Two or three specimens (No. 23646) in salt from "West Florida."

14. *Trachynotus ovatus* (Linn.), Günther.

Six young specimens (No. 23638), 22 millimeters to 32 millimeters long, were obtained at Marquesas Keys, Florida. The radial formulæ are as follows:

(a.) D. vi, i, 18.	A. ii, i, 17.
(b.) D. vi, i, 18.	A. ii, i, 17.
(c.) D. vi, i, 19.	A. ii, i, 18.
(d.) D. vi, i, 18.	A. ii, i, 17.
(e.) D. vi, i, 18.	A. ii, i, 17.
(f.) D. vi, i, 19.	A. ii, i, 17.

15. *Trachynotus goreensis*, Cuv. and Val. Permit; Crevallé.

A large specimen (No. 23647), in salt, about 20 inches long, was sent from West Florida by Dr. Velie. It agrees with the form which we at present call *Trachynotus goreensis*.

Several small specimens (No. 23637), 27 millimeters to 50 millimeters long, apparently of the same species, were obtained at Marquesas Keys.

(a.) D. VI, 1, 19: A. II, 1, 17. (b.) D. VI, 1, 19: A. II, 1, 17. (c.) D. VI, 1, 17; A. II, 1, 17.

The figure given by Girard in the Ichthyology of the Mexican Boundary, plate xi, fig. 4, under the name *Doliodon carolinus*, is pretty certainly taken from a young specimen of this species, though the number of rays in the dorsal has perhaps been changed to make the figure correspond with the description on page 22.

The young *T. goreensis* is distinguished from *T. carolinus* of the same size by the greater height of the spinous dorsal, the smaller number of dorsal and anal rays, and the stronger black blotch upon the lobe of the dorsal.

16. *Carangus pisquetus* (Cuv. and Val.), Girard.—*Leather Jacket*.

Caranx pisquetos, CUVIER and VALENCIENNES, Hist. Nat. Poiss., ix, p. 97.

Carangus pisquetus, GIRARD. Proc. Acad. Nat. Sci., Phila., x, 1858, p. 168.

Paratractus pisquetus, GILL, Proc. Acad. Nat. Sci. Phila., 1862, p. 432.

Three specimens (No. 23642), in salt, from West Florida, apparently belonging to this species.

17. *Selene argentea* (Lacép.), Brevoort.—*Moonfish*.

A single specimen in salt (No. 23641), from West Florida.

GERRIDÆ.

18. *Diapterus harengulus*, Goode & Bean.

Eucinostomus harengulus, GOODE & BEAN, Proc. U. S. Nat. Mus., II, p. 132.

Two specimens (No. 23630), 65 and 66 millimeters long, from Clear Water Harbor, Fla.

D. IX, 10; A. III, 7; P. 15; V. I, 5; C. + 17 +. L. lat. 44; L. transv. $\frac{5}{10}$.

The back has a slight tawny hue, interrupted as it blends with the white of the sides by five or six indistinct, scollop incursions of the body color, giving the upper part of the side of the fish a marbled appearance.

19. *Diapterus homonymus*, n. sp. Goode & Bean.

Eucinostomus argenteus, GIRARD, U. S. & Mex. Bound. Surv., Vol. II, Part II, 1859. Ichth. p. 17, pl. IX, figs. 9-12 (not Baird & Girard, 1854).

Gerres argenteus, GÜNTHER, Cat. Fish Brit. Mus., IV, 1862, p. 256.

Three specimens (No. 23639), 57-70 millimeters long, from Clear Water Harbor.

D. IX, 10; A. III, 7. L. lat. 47; L. transv. $\frac{5}{10}$.

This species is distinct from *Diapterus argenteus* (*Eucinostomus argenteus* of Professor Baird's Report on Fishes of New Jersey coast), though specifically identical with the forms credited to *Gerres argenteus* by Günther, on the testimony of specimens distributed, under the name *Eucinostomus argenteus*, by the Smithsonian Institution.

SPARIDÆ.

20. *Sparus*, sp.—Sheepshead.

A large specimen in salt (No. 23641), from "West Florida," too dilapidated for identification.

D. XII, $10\frac{1}{2}$; A. III, 9. L. lat. 55.

PRISTIPOMATIDÆ.

21. *Hæmulon fremebundum*, n. sp. Goode & Bean.

Two specimens (No. 23628), 60 millimeters and 62 millimeters long, were collected by Dr. J. W. Velie, at Clear Water Harbor, Fla. Their general appearance is similar to that of *Hæmulon trivittatum* (Schn.) Goode (*H. capeuna* of the Bermuda catalogue), but the body is higher, the number of spines and rays in the dorsal fin is different, and the scales are much larger, particularly upon the sides, and the second anal spine much stronger. The form may possibly correspond to that called by Cuvier, *H. caudimacula*, but the description of this species is so vague that it does not seem justifiable to thus sanction the use of the name; particularly since Cuvier's species came from Brazil. The diagnosis here presented is not a complete one, but none better could be prepared from our specimens.

Diagnosis.—Height of body contained 3 times in total length without caudal, $3\frac{1}{2}$ in length of fish, caudal included. Length of head equals height of body. Length of snout less than diameter of eye (the specimens being young), and contained about four times in the length of the head, and equalling length of operculum. Eye contained in length of head less than three times. Posterior extremity of maxillary extends beyond the vertical through the anterior margin of the orbit, but not

to that through the middle. Preoperculum with numerous sharp denticulations upon its posterior margin and around the angle, the latter the largest. Dorsal fin moderately notched, the fourth spines the longest, contained twice in the length of the head. Second anal spine very strong, and longer than the fourth dorsal spine; longer also than third anal spine. Pectoral fin reaches to vertical from 11th spine of dorsal, its length contained $4\frac{1}{2}$ in length of body without caudal, $5\frac{1}{2}$ in total length. Length of ventral equal to that of caudal peduncle, and extending as far back as does the pectoral.

Scales very large, and so irregularly arranged that it is impossible to make a close enumeration of them; there are about forty-eight to fifty-two rows.

Color.—Pale, with a pair of bands as broad as the pupil extending from the snout, where they unite, following the dorsal line at a distance about equal to their own width and connecting with the same at the end of the base of the second dorsal where they reunite; a second broad pair of bands, extending from the snout through the middle of the eye, in a straight line below the lateral line to the base of the caudal; traces, on the head, of a pair of narrower bands between the two pairs already mentioned; also a single stripe, on the mesial line of the body, from a point in advance of the eyes to the region of the dorsal. A very prominent blotch at the base of the caudal fin.

D. XI, 1, 15. A. III, 8. Scales, 5 | (50) | 10.

SERRANIDÆ.

22. *Rhypticus pituitosus*, n. sp. Goode & Bean.

A single young specimen (No. 23555), 47 millimeters long, collected at Key West, Fla. Although immature, its characters seem to distinguish it from all described species. Its nearest ally is the *Rhypticus nigripinnis* of Gill, from Panama,* but we do not feel justified in referring the Key West specimen to this species, in view of the differences in color and the remoteness of the two localities. In radial formulæ and proportions it agrees sufficiently well with Gill's diagnosis.

Diagnosis.—One continuous dorsal. The height of the body is less than the length of the head, being contained $3\frac{1}{2}$ times in length of body without caudal, $4\frac{2}{3}$ times in total length. Length of head, exceeding $\frac{1}{3}$ of length of body without caudal, contained $3\frac{1}{2}$ times in total length. Diameter of eye double the length of the snout and half as long as the lower jaw. Upper jaw reaches nearly to vertical from posterior margin of orbit. Width of posterior expansion of maxilla equals one-third length of lower jaw. Length of upper jaw contained $2\frac{1}{2}$ times in length of head. Length of pectoral equals that of postorbital portion of head. Pectorals extend beyond the tips of the ventrals a distance equal to length of ventrals. Dorsal and anal fins higher posteriorly, the longest

* 1861. GILL, THEODORE N. Synopsis generum Rhyptici et affinium. <Proc. Acad. Nat. Sci. Phila. 1861, pp. 52-54 (p. 53).

rays in the two fins being equal. The longest anal rays reach to, and the longest dorsal rays reach beyond, a vertical through the origin of the middle caudal rays. Pectoral rounded. Ventral short. Scales moderate.

Color.—Very light brown, with numerous small brown spots, the diameter of the largest one-third that of the eye, absent on the abdomen and throat. Traces of light margins to vertical fins.

D. II, 27; A. 15; V. I, 5; P. 14; C. 15. Lateral line 9-90-30.

SPHYRÆNIDÆ.

23. *Sphyræna picuda*.—*Barracouda*.

Specimens in salt (No. 23644) from "West Florida."

MUGILIDÆ.

24. *Mugil brasiliensis*, Agassiz.—*Mullet*.

A single specimen (No. 23643) in salt from West Florida.

ATHERINIDÆ.

25. *Atherina Velieana*, n. sp. Goode & Bean.

A single specimen (No. 23629), 45 millimeters long, was collected by Dr. Velie in Clear Water Harbor, Fla.

Diagnosis.—Height of body contained $4\frac{2}{3}$ times in total length of body, without caudal, the length of the head $3\frac{1}{2}$ times. The spinous dorsal begins behind the vertical from the tip of the pectoral fin, and its origin is in the vertical from the tips of the rather long ventrals. The diameter of the orbit is contained twice in the length of the head, being greater than the width of the interorbital area and more than twice the length of the snout. Snout obtuse, the top of the head being broad and very flat. The cleft of the mouth somewhat oblique, the jaws equal anteriorly. The maxilla extends beyond the vertical from the anterior margin of the orbit, the mandible reaching nearly to that from its middle. Teeth very small in the jaws and on the vomer. The silvery band occupies the third row of scales (the dorsal mesial row not being included in the count); its width is less than half that of the eye.

D. V. I, 9; A. I, $10\frac{1}{4}$; V. I, 5; P. 15. L. lat. 36; L. trans. $6\frac{1}{2}$.

CYPRINODONTIDÆ.

26. *Mollienesia latipinna*, Le Sueur.

Three specimens (No. 23554), about 5 centimeters long, were collected in Clear Water Harbor, Fla., male and females.

SYNODONTIDÆ.

27. *Synodus fœtens* (Linn.), Gill.

A single specimen (No. 23552), 68 millimeters long, was obtained at Key West by Dr. Velie.

D. 13. A. 12. L. lat. 63.

CLUPEIDÆ.

28. *Harengula pensacolæ*, Goode & Bean.

Harengula pensacolæ, GOODE & BEAN, PROC. U. S. N. M., II, p. 153, Nov. 5, 1879.

A single specimen (No. 23631), 90 millimeters long, was obtained by Dr. Velie at Clear Water Harbor. It agrees perfectly with the published description (*sup. cit.*) except that there are 14 abdominal scutes. This character then is demonstrated to be of no value in separating the species of this genus. The pectoral rays number 14 (instead of 15, as in the Pensacola specimens).

ENGRAULIDIDÆ.

29. *Engraulis hiulcus*, n. sp. Goode and Bean.

A single specimen, in bad condition (No. 23632), 47 millimeters long, was collected by Dr. J. W. Velie at Clear Water Harbor, Fla.

Diagnosis.—Height of body contained $5\frac{1}{2}$ times in its length without caudal, $6\frac{1}{2}$ times in total length. Length of head contained $3\frac{2}{3}$ in length without caudal, $4\frac{1}{2}$ in length with caudal. Diameter of the eye greater than length of snout, and one-third the length of the head. Snout somewhat compressed. Minute teeth in both jaws. Maxillary slightly dilated, ending in an acute point extending back to the gill-opening; toothed to the extreme posterior angle of the straight inferior edge. Gill-rakers not very numerous, the longest as long as the eye. Origin of the dorsal fin midway between the posterior margin of the orbit and the root of the caudal fin. Distance of ventral from snout equal to length of maxilla. Anal fin inserted under posterior third of dorsal (12th or 13th ray). Pectorals a little longer than ventrals (half as long as head); their tips falling short of reaching the origin of ventrals by a distance equal to half the diameter of the orbit. The ventrals are half as long as the lower jaw. Lateral stripe one-third of the height of the body at the ventrals. Scales in the lateral line not counted.

D. 15. A. 22.

SILURIDÆ.

30. *Ariopsis felis* (LINN.), Gill & Jordan.

Several young specimens (23633), 25 millimeters long, were obtained by Dr. Velie from Marco Island near Cape Romano, Fla.

The umbilical sacs are still attached, and are 13 millimeters in diameter.

MURÆNIDÆ.

31. *Sphagebranchus scuticaris*, n. sp. Goode & Bean.

A specimen (No. 23636), 750 millimeters long, from Cedar Key, Fla. It appears to belong to the group *Sphagebranchus* as limited by Günther in his key to the species in the genus *Ophichthys*.

The occurrence of this genus in the Gulf of Mexico, or indeed in the Atlantic is noteworthy. All the species recognized by Günther are from Eastern seas, except two from the Mediterranean.

Diagnosis.—Teeth small, conical; gill-openings close together. The dorsal fin commences far in advance of the gill-opening, a little nearer to the top of the snout than to the gill-opening, at a distance from the former equal to three times the length of the snout. The length of the head is contained $8\frac{1}{2}$ times in distance between gill-opening and vent, and 8 times in length of tail. Snout pointed, contained 6 times in length of head. Teeth biserial in jaws and on vomer. Pectorals extremely small. Color, brownish, lighter below.

Measurements.

	Millimeters.
Length of body	750
Length of tail	345
Length of head	43
Width of interorbital area	5
Length of snout	$6\frac{1}{2}$
Angle of mouth from tip of upper jaw	$10\frac{1}{2}$
Angle of mouth from tip of lower jaw	8
Diameter of orbit	$1\frac{1}{2}$
Distance of dorsal from snout	21
Width of gill-opening	$5\frac{1}{2}$
Length of pectoral (right side)	2
Length of pectoral (left side)	$1\frac{1}{2}$

32. *Gymnothorax ocellatus*, Agassiz.

A single specimen (No. 23634), 325 millimeters long, was sent from Clear Water Harbor. The markings are of the typical character.

33. *Crotalopsis mordax* (Poey), Goode & Bean.

Two specimens (No. 23635), 265 and 232 millimeters, were sent by Dr. J. W. Velie from Clear Water Harbor, Fla. They are young, and have the eye contained about $1\frac{1}{2}$ times in the length of the snout. The spots are large, the longest with diameter less than half the length of the head.

TRYGONIDÆ.

34. *Dasybatis sabina* (LESUEUR).—*Sting Ray*.

Three specimens (No. 23648) in salt, each about two feet long, tail included, were sent by Dr. Velie; also, a large skin of a *Sting Ray*, probably *D. tuberculatus*, or perhaps *D. hastatus* or *D. Sayi*.

GALEORHINIDÆ.

35. *Hypoprion brevirostris*, Poey.—*Man-eater Shark*.

A large specimen (No. 23649) in salt was sent by Dr. Velie. This species was incorrectly cited by us, *lapso calami*, in the American Journal of Science and Arts, October, 1877, under the name *Hypoprion longirostris*.

SPHYRNIDÆ.

36. *Reniceps tiburo* (Linn.), Gill.—*Shovel-nose Shark*.

A single small specimen in salt (No. 23650) was sent by Dr. Velie.

GINGLYMOSTOMATIDÆ.

37. *Ginglymostoma cirratum*.—*Nurse Shark*.

A large specimen (No. 23651), about nine feet long, in salt, was sent by Dr. Velie.

NOTE.—The following new species are described in this paper:

Diapterus homonymus, Goode & Bean.

Batrachus tau (Linn.), Cuv., subsp. *pardus*, Goode & Bean.

Hæmulon fremebundum, Goode & Bean.

* *Rhypticus pituitosus*, Goode & Bean.

Atherina Velieana, Goode & Bean.

Engraulis hiuleus, Goode & Bean.

Sphagebranchus scuticaris, Goode & Bean.

UNITED STATES NATIONAL MUSEUM,

Washington, December 31, 1879.

NOTICE OF A NEW SPECIES OF THE 'WILLEMOSIA GROUP OF CRUSTACEA' (RECENT ERYONTIDÆ).

By SIDNEY I. SMITH.

Among the very interesting collections of marine invertebrate animals made during the past two years by the fishermen of Gloucester, Mass., and presented to the United States Fish Commission, for the National Museum, there are two species of podophthalmous Crustacea of peculiar interest. One of these is a remarkable Paguroid which I have already described (Trans. Connecticut Acad., v, p. 50, 1879), but of which several additional specimens have been received since the description was published; the other, which is the subject of this notice, belongs to the "Willemoesia group of Crustacea," first brought into prominent notice by the researches in connection with the Challenger Expedition. Of the latter species I have seen only a single specimen, which was taken at a depth of 250 fathoms, off the coast of Nova Scotia, southeast of Sable Island, latitude $43^{\circ} 10'$ north, longitude $61^{\circ} 20'$ west, by Captain Thomas Olsen, of the schooner Epes Tarr. This specimen is not in very good condition, having been dried (probably after being taken from the stomach of some fish, though there is very little evidence of digestion having begun), and the internal organs consequently destroyed, but it is still sufficient to throw considerable light upon the structural peculiarities of the group to which it belongs, and on this account particularly I am induced to publish a special notice of it.

Of the three genera into which Bate* has recently separated the forms of the "Willemoesia group," our species should unquestionably be referred to *Pentacheles*, but, on account of the at present uncertain

* On the Willemoesia Group of Crustacea. < Annals and Magazine Nat. Hist., V, ii, pp. 273-283, pl. 13, 1878.

tenure of these genera,* I prefer to refer it provisionally to Heller's genus *Polycheles*.† It is apparently very distinct from any of the Atlantic species described by Heller, Willemoes-Suhm,‡ or Bate, but, judging from the very short descriptions given by the last author, it appears to be very closely allied to his *Pentacheles auriculatus* obtained by the Challenger Expedition off the Fiji Islands. In fact I am not able to point out any characters by which the two forms could be distinguished, but, in view of their wide geographical separation, I take it for granted that they are distinct species, and that it would be easy to point out specific characters were Bate's species fully characterized.

Polycheles sculptus, sp. nov.

Male.—The sides of the carapax are nearly parallel posteriorly, but arcuately convergent anteriorly, and the greatest breadth is just in front of the cervical suture, and is about three-fourths of the length along the median line. As seen from above, the anterior margin is concave in outline, so that the lateral angles, which are acute and spiniform, are much in advance of the rostrum, which is armed with two spines close together and projecting obliquely upward and forward. About a third of the space between the median line and the lateral angle each side is occupied by a very deep orbital sinus nearly parallel with the lateral margin, considerably deeper than broad, somewhat narrowed and evenly rounded posteriorly, and completely filled by a large ophthalmic lobe (figure 1, c). On the inner side of this sinus the frontal margin projects in a small spiniform tooth, but outside, the margin is unarmed and curves regularly to the lateral angle. Just behind the orbital sinus there is a smooth and evenly curved depression in the surface of the carapax exposing a small area on the posterior part of the ophthalmic lobe, more fully described beyond. The cervical suture divides the dorsal surface of the carapax into two pretty nearly equal portions, and is deep and conspicuous, but is indicated in the lateral margin, each side, by a slight emargination only, which is scarcely deeper than the emargination between the anterior and posterior lobes of the hepatic region. The lateral margin is armed, on the anterior lobe of the hepatic region, with (including the anterior angle) six small and slender spiniform teeth directed forward, and on the posterior lobe with three more. The lateral margin, behind the cervical suture, is armed with seven similar teeth

* NORMAN.—“On the Willemoesia Group of Crustacea.” < Annals and Magazine Nat. Hist., V, ii, pp. 332-335, 1878.

BATE.—On the Willemoesia Group of Crustacea. < Annals and Magazine Nat. Hist., V, ii, pp. 484-489, 1878.

NORMAN.—Remarks on recent Eryonidae. < Annals and Magazine Nat. Hist., V, iv, pp. 173-182, 1879.

† Beiträge zur näheren Kenntniss der Macrouren. < Sitzungsberichte Akad. der Wissenschaften, Wien, math.-nat. Classe, xlv, Abth. i, pp. 389-393, pl. 1, figs. 1-6, 1862.

Die Crustaceen des südlichen Europa, pp. 209-212, pl. 7, figs. 1, 2, 1863.

‡ On some Atlantic Crustacea from the Challenger Expedition. < Trans. Linnæan Soc. London, II, i, pp. 50-56, pls. 12, 13, 1875.

which become successively more remote posteriorly. There is a slight median carina extending the whole length of the carapax, and armed, behind the two rostral spines, first with a single small spine directed forward, then with two, side by side and very close together, then with one, then with two on the posterior edge of the cervical suture, then with two more, and finally with two somewhat larger and more widely separated spines projecting forward from the anterior edge of the broad and prominently raised posterior margin. In front of the cervical suture there is an irregular longitudinal dorso-lateral line of five minute spines each side, and back of these a single spine each side on the posterior edge of the cervical suture. Extending from the posterior margin nearly to the cervical suture, there is a sharp sublateral carina parallel to the lateral margin, about a third of the way from it to the median carina, and armed with five small spines on one side and six on the other. The extra spine is on the left side, and next to the last in the series, but is accidentally omitted in figure 5.

The ventral regions of the carapax are inflected each side at a very acute angle with the dorsal surface, and, the sternum being narrow in front, the ventral regions are very broad in the middle, being broadest opposite the bases of the first and second peræopods. The ventral region each side is divided longitudinally into three approximately equal parts by two prominent carinæ; the outer carina (marking the pleurotergal suture?) extends from the anterior margin at the base of the antenna, in a slightly sinuous line, toward the postero-lateral margin of the carapax; the anterior half is very prominent and armed with numerous small spines directed outward, while the posterior half is much less conspicuous, unarmed, and disappears entirely before reaching the posterior angle of the carapax. The inner carina extends along the branchial region from near the base of the first peræopod quite to the postero-lateral angle of the carapax; the extreme anterior portion is not prominent, but from opposite the third peræopod posteriorly it is very prominent, acute, and armed with ten to fifteen sharp spines. The outer of the three longitudinal regions thus marked out is divided transversely by the cervical suture, and the anterior portion (subhepatic region) is divided transversely into an anterior and a posterior lobe by a groove nearly or quite as conspicuous as the cervical. In the frontal margin of this anterior lobe (figure 2), and near its inner side, there is a deep sinus corresponding to the orbital sinus of the dorsal surface, but not quite as wide, and open nearly to the dorsal surface, except where it is crossed by a protuberance from the ventral portion of the ophthalmic lobe (c, figure 2).

On the upper surface of the carapax, the orbital sinus, each side, is completely filled by the dorsal part of the ophthalmic lobe, of which the anterior margin is slightly concave in outline and continuous with the anterior margin of the carapax, but has a small tubercle near the middle. The dorsal surface of the lobe is smooth, calcareous and opaque,

and on a level with the adjacent surface of the carapax except posteriorly, where a small oval area of the extremity of the lobe is exposed by a depression in the carapax. This oval area is thin, semitranslucent, and not calcareous, and has every appearance of being a true corneal area, although I am unable to detect any evidence of facets. The carapax along the margins of the sinus is in close contact with the ophthalmic lobe but is not really connected with it. From the lower portion of each ophthalmic lobe there is an elongated, cylindrical and somewhat conical, but obtuse and pointed, protuberance, of which the base rests in a transverse groove in the base of the antenna, while the terminal portion extends well across the open, ventral side of the orbital sinus. Upon the obtuse extremity of this protuberance there is a nearly circular area similar to the cornea-like area at the posterior extremity of the dorsal part of the lobe.

Unfortunately the specimen is not in sufficiently good condition to enable me to determine positively in regard to the structure of these cornea-like areas, but that they are connected with the optic nerves and are sensitive to light there is, I think, no chance for reasonable doubt. While it seems probable that all four of these areas are really faceted like the eyes of ordinary Podophthalmia, it is possible that they may be large, simple, or nearly simple eyes, like the eyes of some Amphipoda and Cumacea. The division of the ophthalmic lobe each side into two or more "eyes" has not, I think, before been noticed among the Decapoda, and is certainly an interesting fact in morphology, but it is apparently not a character of much systematic or phylogenetic value. Among the Schizopoda, the lamellar expansion of the ophthalmic lobes in *Amblyops*, and their broad expansion and partial union in *Pseudomma*, are quite as remarkable and apparently somewhat similar modifications; and *Ampelisca* and *Biblys*, among the Amphipoda, are cases in which there are two simple eyes each side, while in the closely allied *Haploops* the number apparently varies in the different species.

The peduncles of the antennulæ (figures 1, 2) are very stout, being stouter even than the peduncles of the antennæ. The basal portion of the proximal segment is longer than the two distal segments, is armed on the distal portion of the outer margin with two spiniform teeth, and the inner side is broadly expanded and prolonged into an acute scale-like appendage upturned and densely ciliated along the inner margin, and extending considerably beyond the distal segment and nearly as far as the tip of the antennal scale (*b*, figure 2). The second and third segments are subcylindrical, and, as seen from above, are each about as broad as long, the second being somewhat larger than the third. The inner or major flagellum is about as long as the carapax. The minor flagellum is about as long as the peduncle of the antenna, about half as thick as the base of the major flagellum, of nearly uniform thickness for two-thirds its length, then tapers rapidly to a very slender tip, and is thickly ciliated along the inner margin distally.

The three first segments of the peduncle of the antenna are very short, the three together being scarcely longer than the fifth segment. The first segment is loosely articulated with the sternum of the antennal segment, so as to be freely movable upon it; it is very short upon the outside, but expands somewhat on the inner side, which terminates distally in a thin tubular process (*a*, figure 2) arising from the oral side of the segment and directed upward to a level with the dorsal side so that, in the ordinary position of the appendages, its orifice is closed by contact with the first segment of the peduncle of the antennula. This tubular process readily admits a large bristle which can be pushed through it round into the cavity of the segment itself. It undoubtedly contains the canal of the green gland. The second segment is small, closely united with the third, and bears upon its outer side a slender scale-like appendage (*a*, figure 1) which reaches nearly to the tip of the peduncle, is about five times as long as broad, and thickly ciliated along both edges. The third segment, as seen from below, is almost wholly internal to the second, and is armed on the distal part of the inner margin with a small spiniform tubercle. The fourth and fifth segments are subcylindrical, the fourth is slightly longer than the fifth, and both are ciliated each side. The flagellum is about as thick at base as the major flagellum of the antennula, but tapers rather more rapidly and is probably considerably shorter.

The buccal opening is nearly square. The branchiostergites extend forward quite over the sternum of the antennary somite, and their anterior extremities are applied to the basal segments of the antennæ, which, however, are freely movable upon the antennary somite. The epistome is short, not extending at all in front of the bases of the antennæ, is nearly on a level with the dorsal wall of the efferent passages from the branchial chambers and on a plane above the bases of the antennæ, so that the efferent passages terminate in the space between the upturned edges of the squamiform processes of the inner sides of the basal segments of the antennulæ and just beneath the short two-spined rostrum. In the middle of the slightly raised and regularly arcuate posterior edge of the epistome there is a slight elevation with a tuft of hairs, as described and figured by Willemoes-Suhm in *Willemoesia leptodactyla*. The anterior part of the endostome is on a plane somewhat above the plane of the epistome, but the space below is filled by the soft and fleshy labrum which projects considerably below the raised posterior edge of the epistome, and does not differ essentially from the labrum in Astacidæ or Scyllaridæ.

The mandibles are apparently wholly without molar areas, and expand into very broad and thin lamellæ sharply serrated along the cutting edges. The mandibular palpus is short and apparently composed of only two segments, the distal being shorter than the proximal. There may be an additional short basal segment, which I am unable to discover without injuring the specimen, so that the palpus may prove to be triarticulate.

The lobes of the metastome (labium) are very narrow and widely separated at base.

The two lobes of the first maxilla are very much as described and figured by Willemoes-Suhm in *Willemoesia leptodactyla*, the two lobes being very slender and strongly incurved, the anterior being the larger and having at its base a minute rudimentary appendage.

The second maxilla has two small and very slender endognathal lobes and a very large scaphognath, the anterior, or exognathal, portion of which reaches nearly forward to the base of the antenna.

The inner or endognathal lobes of the maxilliped are small and rudimentary, but there is a very large and terminally bilobed lamella, apparently representing the exognath, which extends forward considerably in front of the epistome, where its terminal lobes are somewhat upturned and serve as the lower wall of a tube from the efferent branchial opening. This lamella is continuous posteriorly with the very large epignath which extends far back into the branchial chamber.

Both pairs of gnathopods are apparently entirely without exognathal or epignathal branches. The first pair (second maxillipeds) reach scarcely beyond the ischia of the second pair, and the three distal segments are very short, the carpus being narrow at base but expanded and somewhat flattened distally, while the propodus and dactylus taken together form a conical tip much shorter than the carpus.

The second pair of gnathopods (external maxillipeds) are very slender, ciliated but unarmed with teeth or spines, and, when extended, reach nearly to the distal ends of the peduncles of the antennulæ. The ischium is about as long as the three succeeding segments and only a little stouter than the merus, which is a little more than half as long, and the three distal segments are subcylindrical, of about equal length, and taken together are about as long as the merus.

The terminal portion of each of the first pair of pereopods is wanting in the specimen examined, but the one on the left side is perfect to near the distal end of the merus. The coxa is very stout, far stouter than the succeeding segments. The basis is completely anchylosed with the ischium, which reaches to the tip of the second gnathopod, is much expanded distally, but at the same time very much compressed dorso-ventrally, and is smooth and naked. The portion of the merus which is still present is about 20^{mm} long, is smooth and compressed like the ischium, is of equal width with the ischium where it articulates with it, but is slightly expanded for about half its length, then slightly narrowed distally, and is armed near the middle of the outer edge with two small spines.

The second pereopods (figure 3) are slender, densely ciliated along the edges, and reach to the tips of the peduncles of the antennæ. The basis is anchylosed with the rather short ischium. The merus is considerably longer than the ischio-basis and reaches to the edge of the carapax. The carpus is a little shorter than the merus. The basal part of the propodus is a very little longer than the carpus, and is flattened

and somewhat expanded distally, where it is fully a third as broad as long; the digital portion is very slender, nearly as long as the basal portion, nearly straight to the slender, acute, and chitinous tip which is strongly curved, and the prehensile edge is thin and very minutely serrate. The dactylus is almost exactly of the same form as the digital portion of the propodus, and its prehensile edge is armed in the same way, but the cilia upon the outer edge are much longer than on the corresponding part of the propodus.

The third and fourth pairs of pereopods are successively a very little shorter than the second and have very nearly the same form. From the coxal to the meral segment they are very nearly as stout as in the second pair, but the three distal segments are much more slender. The basal part of the propodus is subcylindrical and only very slightly expanded and flattened distally, while the digital part and the dactylus are equal in length, very slender and weak, straight throughout, without incurved or chitinous tips, and densely ciliated along the prehensile edges.

The fifth or last pair of pereopods (figure 4) are considerably shorter and more slender than the fourth, and all the segments except the propodus and dactylus have very nearly the same relative proportions as in that pair. The basal portion of the propodus is a little longer than the carpus, subcylindrical and slightly tapering distally; the digital portion is about as long as the proximal thickness of the propodus, very slender, and tapers to a rounded tip. The dactylus is fully twice as long as and much stouter than the digital part of the propodus, and straight and subcylindrical.

As seen from above the sides of the pleon are nearly straight, and form, with the telson, a regular acute triangle. The first five segments are carinated dorsally, and the carina projects forward from each segment in an acute tooth, but the carina and tooth are small and low on the first segment, increase rapidly to the fourth, while on the fifth they are scarcely as prominent as on the fourth, and on the sixth the carina is inconspicuous and there is no tooth, but the top of the carina is traversed by a narrow longitudinal sulcus. On the first segment there are, in addition, two slender spines each side projecting forward above the articulations with the carapax. The dorsal surface of the pleon, either side of the median carina, is smooth and scarcely at all sculptured, but along the lateral margin, where the pleura bend abruptly and nearly perpendicularly downward, there is a series of deep longitudinal sulci, except upon the narrow first segment, which is unsculptured, and upon the sixth, where the sulcus is replaced by a simple carina. Of the pleura themselves, the first is nearly obsolete, the second is broader than deep, projecting back over the third with a broadly rounded margin, and forward in a prominent but rounded angle, and has a central circular depressed area; the succeeding pleura decrease regularly in size posteriorly, scarcely overlap when the abdomen is extended, are convex in outline posteriorly but straight or slightly concave anteriorly, and the third, fourth, and fifth are ornamented with a median curved

carina extending two-thirds of the length, but not well marked upon the fifth.

The telson is pretty regularly triangular, about twice as long as broad, is convex and slightly grooved longitudinally above, and terminates in an acutely rounded tip unarmed with spines. The lamellæ of the uropods scarcely reach the tip of the telson; the outer is nearly as broad as long, regularly rounded in outline, and stiffened by two slightly diverging ribs in addition to the thickening of the outer margin; the inner lamella is stiffened by a single median rib, is nearly twice as long as broad, the lateral margins are approximately straight and parallel, and the tip is regularly rounded in outline.

The first pair of pleopods are about 15^{mm} long with an imperfect articulation at about a third of the way from the base to the tip; the basal portion is somewhat triquetral, and the terminal portion expands into a smooth, naked, and thin lanceolate lamella slightly concave posteriorly. The second pair of pleopods are about 24^{mm} long, and the base and lamellæ are of about equal lengths. The lamellæ are narrow, lanceolate, and thickly ciliated along the edges; the inner lamella is slightly broader than the outer, and bears the two styliform processes usually characteristic of males among the Macrura. These styliform processes are about 3^{mm} long, and arise together at about a third of the way from the base to the tip of the lamella; the inner, like that upon the three succeeding pairs of pleopods, arises from the slightly thickened inner edge of the lamella, is ridged, of nearly equal width to the rounded tip, and nearly naked except a line of cilia along the posterior margin. The outer process arises just in front of the inner, and its base is at a right angle to that of the outer; it is more slender than the outer, tapers distally, and is ciliated on both edges and on the anterior surface. The three succeeding pairs of pleopods are similar to those of the second pair, but are successively a little shorter, and they want the outer of the two styliform processes on the inner margin of inner lamella.

The single specimen examined affords the following measurements:

	mm.
Length from front of carapax to tip of telson	92
Length of carapax along median line	39
Length of carapax between extremities of lateral margin.....	45
Breadth between lateral spines of anterior margin.....	20
Breadth between postero-lateral angles (about).....	22
Greatest breadth (in front of cervical suture).....	30
Length of first pereopod to near distal end of merus.....	40
Length of second pereopod.....	33
Length of fifth, or last, pereopod.....	20
Length of peduncle of antennula.....	9
Length of major flagellum	45
Length of minor flagellum	13
Length of peduncle of antenna.....	12
Length of antennal scale.....	9
Length of flagellum (at least)	30
Length of pleon.....	53
Length of telson	16

PLATE VII.

POLYCHELES SCULPTUS.

Fig. 1, dorsal view of the anterior portion of the right side of the carapax: *a*, antennal scale; *b*, proximal segment of antennula; *c*, ophthalmic lobe.

Fig. 2, ventral view of the anterior portion of the right side of the carapax: *a*, tubular process containing the canal from the green gland; *b*, process of the ophthalmic lobe; *c*, base of the first pereopod

Fig. 3, terminal portion of the second pereopod of the right side.

Fig. 4, terminal portion of the fifth pereopod of the left side.

Fig. 5, dorsal view of the entire specimen.

Fig. 6, lateral view of the pleon.

(Figs. 1 to 4 from drawings by S. I. Smith; Figs. 5 and 6 from drawings by J. H. Emerton.)

Fig. 5.

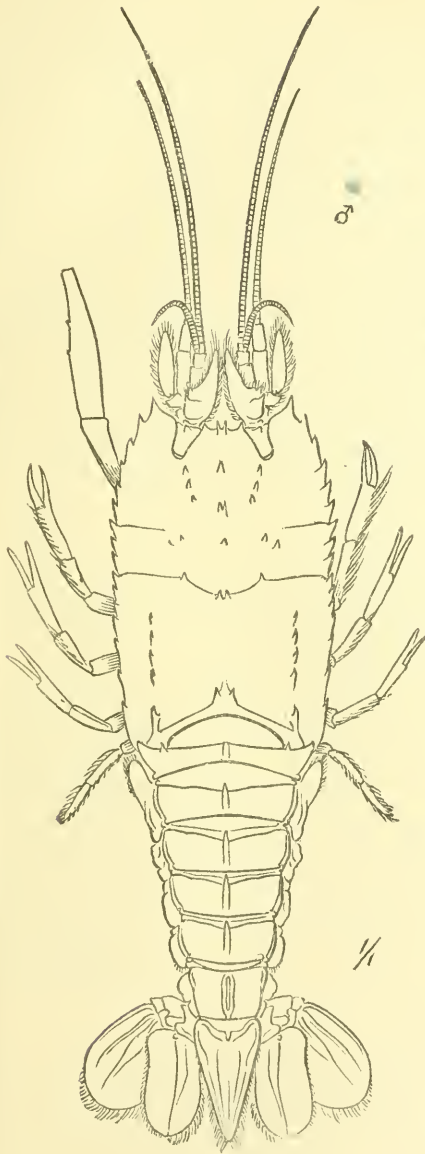


Fig. 1.

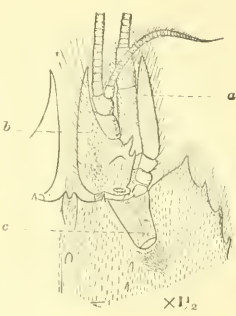


Fig. 2.

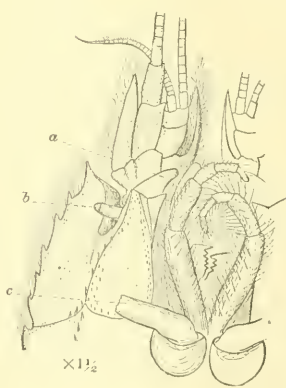


Fig. 3.



Fig. 4.

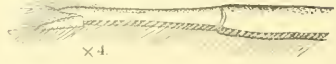
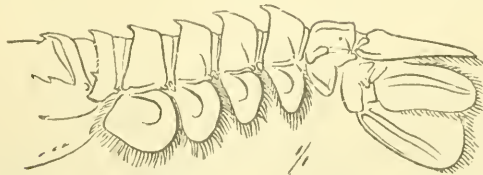


Fig. 6.



POLYCHELES SCULPTUS.



Owing to the imperfections of the descriptions of the species of the "Willemoesia group," already known, it is useless to attempt to point out which of the characters above alluded to are common to all the species or only specifically or generically (if there be more than one genus among the species now known) characteristic.

In regard to the openings of the green glands it may be well to notice that Willemoes-Suhm was unable to discover them in *Willemoesia leptodactyla*. He might easily have overlooked them, however, if they were, as is probable, situated as in our species. One of Bate's figures of *Pentacheles anthrax* (Annals and Mag. Nat. Hist., V, ii, pl. 13, fig. 2, 1878) apparently shows the tubular process just as it exists in our species, although I find no reference to it in the accompanying text. Bate subsequently, however, appears to allude to this same process as "the olfactory tubercle of the second or outer antenna," though I cannot find that he anywhere alludes to Willemoes-Suhm's inability to discover the openings of the green glands.

NEW HAVEN, CONN., December 30, 1879.

DESCRIPTIONS OF SOME GENERA AND SPECIES OF ALASKAN FISHES.

By TARLETON H. BEAN.

The collections of the United States National Museum contain many Alaskan fishes, two of which are here described as new to science.

Cottus polyacanthocephalus Pallas.

This species has some points in common with *Boreocottus axillaris* Gill. I cannot find, in the description of the genus *Boreocottus*, anything to separate it from *Cottus*. The specimens here described are numbered 23499 in the Museum register. They were collected at Unalaska, by Mr. William H. Dall, and were catalogued in his notebook at No. 900.

LIST OF SPECIMENS.

23499 *a*. Length 185 millimeters without caudal.

D. X, i, 14; A. 13; V. I, 3; P. 18.

23499 *b*. Length 138 millimeters without caudal.

D. X, i, 13; A. 11; V. I, 3; P. 18.

23499 *c*. Length 142 millimeters without caudal.

D. X, i, 14; A. 12; V. I, 3; P. (right) 18, (left) 16.

DIAGNOSIS.

B. VI. D. X. I, 13 to 14. A. 11-13. V. I, 3. P. 18.

Two small spines above the snout; one above each orbit, with four obscure ones behind it. A pair of small spines on the occiput. Three

preopercular spines, two of which are at the angle; the longer of these is half as long as the upper jaw, and extends nearly as far back as the opercular spine. The distance between the eyes equals their long diameter. The fourth spine of the first dorsal is as long as the intermaxillary band of teeth of either side, and is nearly $\frac{1}{3}$ as long as the head. The ventral terminates at a distance from the vent, and is equal in length to the maxillary bone. The pectoral reaches to the end of the spinous dorsal, and to the vent. The length of the head is contained $2\frac{1}{3}$ to $2\frac{1}{2}$ times in the total length without caudal. The length of the upper jaw equals half the length of the head; the lower jaw is slightly longer, but is received within the upper. The ground color is dark brown; the sides and tail are more or less distinctly mottled and banded with yellowish. The spinous dorsal has two and the soft dorsal three oblique dark bands. The anal has four oblique dark bands, the first and last being very narrow. The pectoral has three irregular bands of dark brown intermingled with yellowish. The caudal is indistinctly banded with dark brown and tipped with yellowish.

Melletes * gen. nov. *Cottidae*.

GENERIC CHARACTERS.—Head broad, depressed, rounded in front; body subcylindrical, compressed posteriorly; head naked, with a small number of cutaneous flaps, the two on the chin simulating barbels; a narrow band of scales following the dorsal outline of the body and uniting with its fellow around the origin of the spinous dorsal; body elsewhere naked with the exception of a few prickles on its anterior part below the lateral line; sides between the anal fin and the lateral line furnished with numerous small, pointed flaps covering minute depressions in the skin; lateral line as in *Cottus*. Two contiguous dorsals separated by a notch, the spinous dorsal being the higher; the membrane behind the second, third, and fourth spines deeply cleft; membrane extending higher than the spines. Pectorals subelliptical when fully expanded, the rays all single. Ventrals thoracic, immediately behind the pectorals, elongate, furnished with stiff setæ on their inner surface along the course of the rays. Jaws, vomer, and palatines armed with villiform teeth. Air-bladder absent. Stomach caecal. Pyloric appendages in moderate number (6 in the type species). Branchiostegals 6.

Melletes papilio sp. nov.

The only specimen of this species in the Museum collection is the type of the present description; it is catalogued at number 23751 of the Museum Fish Register. The length of the example, measured to the origin of the middle caudal rays, is 185 millimeters. It is an alcoholic specimen in excellent condition.

DESCRIPTION.—By length of the body is to be understood its length from the tip of the snout to the origin of the middle caudal rays. The

* Μηλλητης, a loiterer, from its habit of remaining in shallow pools when the tide recedes, where it is taken by hand in great quantities by the natives (*vide* Elliott).

body is moderately elongate, rather slender, somewhat compressed posteriorly, has a narrow band of scales close to its dorsal outline, and is otherwise naked with the exception of a few prickles on the sides. The head is naked; it has two small cutaneous appendages on the chin, one near the end of each maxillary, two above the eyes, two on the vertex, and one near the upper angle of each gill-opening. The branchiostegal membrane is free from the isthmus posteriorly.

The greatest height of the body (.25) is one-fourth of its length, and equals the length of the external caudal rays (.25); its height at the ventrals (.23) is contained $4\frac{1}{2}$ times in the length. The least height of the tail (.07), equals the distance between the eyes (.07), and the length of the antecedent spine of the second dorsal (.07). The length of the caudal peduncle, measured from the end of the second dorsal to the origin of the middle caudal rays, equals half the length of the maxillary (.16).

The greatest length of the head to the end of the opercular flap (.37) is contained $2\frac{2}{3}$ times in the length of the body, and equals twice the length of the mandible (.185); its greatest width (.23) equals the length of the base of the spinous dorsal (.23). The distance between the eyes (.07) is contained 3 times in the length of the second (.21) and third dorsal spines. The length of the snout (.09), or the distance from the end of the snout to the orbit (.09), equals the long diameter of the eye (.09), and half the length of the upper jaw (.18). The length of the maxillary (.16) equals twice the length of the caudal peduncle, and half the length of the anal base (.32). The length of the mandible (.185) equals half the length of the head, and is contained $5\frac{1}{2}$ times in the length of the body.

There are two obtuse spines on the snout, two above the posterior parts of the orbits, and two on the vertex, the last four being provided with short filaments. I can find none on the spines of the snout. There are two minute, barbel-like filaments on the chin, and there is one short cutaneous tag close to the end of each maxilla and on the membrane at the upper angle of the gill-opening. The type is well preserved, but a little stiffened by long immersion in very strong alcohol.

The distance of the spinous dorsal from the snout (.30) equals $2\frac{1}{2}$ times the length of its first spine (.12). Its length of base (.23) equals the greatest width of the head (.23). The second and third dorsal spines are equal, their length (.21) being contained nearly 5 times in the length of the body. The fourth dorsal spine is the longest (.22); its length is contained $4\frac{1}{2}$ times in the length of the body. The length of the fifth dorsal spine (.20) is contained 5 times in the length of the body. The last dorsal spine (.055) is shorter than the antecedent spine (.07) of the second dorsal. The longest ray of the second dorsal (.175) is half as long as the distance of the pectoral from the snout (.345); the last ray (.035) is half as long as the antecedent spine.

The distance of the anal from the snout (.59) is nearly twice that of the spinous dorsal from the same point. The length of the anal base (.32) is twice that of the maxillary. The longest anal ray (.15) is twice

as long as the last (.075). The tips of the anal rays are free from the membrane, some of them for a distance equal to one-half the diameter of the orbit.

The length of the middle caudal rays (.235) is contained $4\frac{1}{2}$ times in that of the body; the length of the external rays, four times.

The length of the longest pectoral ray (.395) is nearly twice that of the fifth dorsal spine; it extends to the vertical through the root of the sixth anal ray.

The distance of the ventral from the snout (.27) equals three times the long diameter of the orbit. The length of the longest ventral ray (.49) is nearly one-half that of the body; it extends to the vertical through the root of the seventh anal ray. The tips of the rays extend beyond the membrane, in one case about a third the length of the fin. The ventrals are furnished with stiff setæ on their under surface, following the course of the rays.

Radial formula : B. VI; 1st D. XI; 2d D. I, 20; A. 17; C. 11 (developed rays); P. 17; V. I, 4.

Color.—The ground color of the upper part of the body is a light grayish brown, on which are four markings of a darker brown, of which the first three are band-like and extend below the lateral line, while the fourth is widest below and sends only a narrow point below the lateral line. Between the third and fourth large body-markings there is a small blotch of similar color beginning at the lateral line and extending downward a distance equal to about $\frac{1}{3}$ the long diameter of the orbit. At the base of the caudal is a band-like marking similar in color to the body-markings, and the posterior half of the caudal bears two obscure bands of brown; between the brown markings there is an area of yellowish white. The top of the head is sienna brown. The cheeks are brown of a darker tint than the rest of the head. The lower parts of the head are yellowish white, as are the bases of the pectoral and the anterior part of the belly. The lower parts of the body are grayish white, dotted here and there with spots of milky white. The largest of these milky white spots are not more than $\frac{1}{7}$ as long as the orbit. The belly has some similar spots, resembling in this respect the male of *Cottus scorpius* subspecies *grönlandicus*, but the spots are much smaller than in that species. The spinous dorsal is mainly very dark brown with two light areas in its anterior and posterior parts. The second, third, and fourth body-markings are continued upon the soft dorsal; that proceeding from the fourth body-marking, however, is continued forward forming a margin for the upper posterior part of the soft dorsal. The ground color of the pectorals is a grayish brown. On this ground color the upper portion of the fin, on its anterior surface, has several bands of milky white bordered with sienna brown; the lower part of the anterior surface is mottled with nearly linear markings of sienna brown bordered with milky white. The markings of the posterior surface of the pectoral correspond in the main with those of the anterior surface; but the tips of the membrane between many of the rays are

milky white. The ventrals are streaked and spotted with sienna brown and milky white on both surfaces, the membrane close to the third ray having a regular alternation of these brown and white spots. The anal is grayish brown sparsely mottled with spots similar to those on the ventrals. The peritoneum is silvery white.

The length of the intestine is equal to the distance from the tip of the snout to the end of the anal fin. The genital papilla is short, about equal in length to the opening of the vent.

TABLE OF MEASUREMENTS.

Melletes papilio Bean.

Locality	Saint Paul's Island, Alaska, 1872. H. W. Elliott.		
	Milli- meters.	100ths of length to origin of middle caudal rays.	Times in length to origin of middle caudal rays.
Length to origin of middle caudal rays	185	.....	.....
Body:			
Greatest height		25	4
Greatest width		18	.....
Height at ventrals		23	4½
Least height of tail		7	14
Length of caudal peduncle		8	12½
Head:			
Greatest length		37	2½
Greatest width		23	4½
Width of interorbital area		7	14
Length of snout		9	11
Length of operculum to end of flap		12	8½
Length of upper jaw		18	5½
Length of maxillary		16	6½
Length of mandible		18½	5½
Distance from snout to orbit		9	11
Diameter of orbit		9	11
Dorsal (spinous):			
Distance from snout		30	3½
Length of base		23	4½
Length of last spine		5½	.....
Length of first spine		12	8½
Length of second spine		21	nearly 5
Length of third spine		21	nearly 5
Length of fourth spine		22	4½
Length of fifth spine		20	5
Dorsal (soft):			
Length of base		42	.....
Length of antecedent spino		7	14
Length of first ray		14½	7
Length of longest ray		17½	nearly 6
Length of last ray		3½	.....
Anal:			
Distance from snout		59	.....
Length of base		32	3½
Length of first ray		13	nearly 8
Length of longest ray		15	6½
Length of last ray		7½	.....
Caudal:			
Length of middle rays		23½	4½
Length of external rays		25	4
Pectoral:			
Distance from snout		34½	nearly 3
Length		39½	2½
Ventral:			
Distance from snout		27	3½
Length		49	2
Branchiostegals	VI	.....	.....
Dorsal	XI, 1, 20	.....	.....
Anal	17	.....	.....
Caudal	11	.....	.....
Pectoral	17	.....	.....
Ventral	I, 4	.....	.....

*Dallia** gen. nov. *Umbrida*?

Body oblong, covered with cycloid scales of small size with radiated striae; lateral line not conspicuous; eye smaller than in *Umbrida*; cleft of the mouth of moderate width. Ventrals inserted in front of the beginning of the dorsal, composed of three rays. Basis of anal as long as, or longer than, that of dorsal. Caudal fin rounded and many-rayed. Villiform teeth on the intermaxillaries, the mandible, the vomer, and the palatines. Pectoral rounded and many-rayed.

Dallia pectoralis sp. nov.

B. VII-VIII; D. 12-14; A. 14-16; V. 3; P. 33-36; C. 30-33.

The height of the body is contained 4 to $4\frac{1}{2}$ times in its length without caudal; length of head $4\frac{1}{4}$ to $4\frac{1}{2}$ times. The eye is $\frac{1}{7}$ to $\frac{1}{6}$ as long as the head. The pectoral is $\frac{1}{2}$ as long as the head to end of upper jaw, the ventrals $\frac{1}{3}$ as long. The origin of the dorsal is twice as far from the end of the snout as from the origin of the middle caudal rays. The longest dorsal rays are a little more than half the length of the head. The anal begins almost directly under the origin of the dorsal and has nearly the same extent; its longest rays equal or slightly exceed the longest dorsal rays. The ventrals originate in advance of the dorsal and can be made to reach to or slightly beyond the origin of the anal. The vent is immediately in front of the beginning of the anal. About 77 scales in lateral line; 11 rows between the dorsal and the lateral line and 11 between the lateral line and the anal.

Color.—Dusky brown mottled with whitish, all the fins similarly colored, the dusky spots sometimes becoming confluent on the caudal and simulating bands; belly mainly whitish, but in some specimens thickly covered with small dusky spots.

LIST OF SPECIMENS.

- 23498 *a-g*. (collector's number, 1430) 7 specimens. St. Michaels, Alaska, Feb., 1877. L. M. Turner.
 23498 *a*. D. 13; A. 16; V. 3; P. 36; C. 33; B. 8. Length 205 millimeters.
 23498 *b*. D. 13; A. 14; V. 3; P. 33; C. 31; B. 7-8. Length 200 millimeters.
 23498 *c*. D. 14; A. 15; V. 3; P. 33; C. 31; B. 8. Length 180 millimeters.
 23498 *d*. D. 14; A. 14; V. 3; P. 33; C. 30; B. 7-8. Length 184 millimeters.
 23498 *e*. D. 13; A. 14; V. 3; P. 35; C. 30; B. 8. Length 175 millimeters.
 23498 *f*. D. 14; A. 14; V. 3; P. 35; C. 30; B. 8. Length 170 millimeters.

* Dedicated to Mr. W. H. Dall, of the United States Coast Survey, in appreciation of his contributions to the zoölogy of Alaska.

23498 *g.* D. 13; A. 14; V. 3; P. 35; C. 31; B. 8. Length 167 millimeters.

6661. 17 specimens. St. Michaels, Alaska. H. M. Bannister.

a. Length 210 millimeters. D. 13; A. 14; V. 3; P. 33; C. —; B. 8.

b. Length 200 millimeters. D. 14; A. 14; V. 3; P. 35; C. —; B. 8.

c. Length 135 millimeters. D. 12; A. 14; V. 3; P. 35; C. 30; B. 8.

The remaining fourteen specimens vary in length from 110 to 180 millimeters.

UNITED STATES NATIONAL MUSEUM,
Washington, January 5, 1880.

**FOURTH INSTALMENT OF ORNITHOLOGICAL BIBLIOGRAPHY:
BEING A LIST OF FAUNAL PUBLICATIONS RELATING TO BRIT-
ISH BIRDS.**

By DR. ELLIOTT COUES, U. S. A.

The Appendix to the "Birds of the Colorado Valley" (pp. 567 [1]-784 [218]), which gives the titles of "Faunal Publications" relating to North American Birds, is to be considered as the *first* instalment of a "Universal Bibliography of Ornithology".

The *second* instalment occupies pp. 239-330 of the "Bulletin of the United States Geological and Geographical Survey of the Territories", Vol. V, No. 2, Sept. 6, 1879, and similarly gives the titles of "Faunal Publications" relating to the Birds of the rest of America.

The *third* instalment, which occupies the same "Bulletin", same Vol., No. 4 (in press), consists of an entirely different set of titles, being those belonging to the "systematic" department of the whole Bibliography, in so far as *America* is concerned. Here come the titles of all publications relating to particular species, genera, or families of American Birds, systematically arranged, *by families*, and in chronological order.

These three previous instalments represent a nearly complete Bibliography of *American* Ornithology.

This present, *fourth*, instalment of the work is of the same character as the first two: that is, it relates to "regional" or "faunal" as distinguished from "systematic" ornithology; and it undertakes to do for *British* Birds what the first two did for *American*.

That is to say: here belong the titles of all publications treating of British Birds as such, exclusively, and indiscriminately or collectively. In publishing these preliminary instalments, it is necessary to draw a hard and fast line between those titles which are and those which are not to be found in each one of them—a line which would be very evident to one cognizant of the plan of the whole Bibliography, though by no means obvious at first sight. It is therefore necessary for me to be explicit here.

In order to fall within the scope of this fourth instalment, a publica-

tion must relate to British Birds as such. Secondly, it must relate to British Birds exclusively. Thirdly, it must relate to British Birds of more than one species, genus or family. For, first, a publication on, say, *Larus glaucus* and *Tringa canutus* as observed in Greenland does not belong here, though both these species are British Birds. For, secondly, a work on the Birds of Europe does not belong here, though including all British Birds. For, thirdly, a paper on the occurrence of *Phalaropus hyperboreus* in Great Britain, or one on the habits of *Lagopus scoticus*, does not belong here, as the scheme of the whole work carries one of these to *Phalaropodidae*, the other to *Tetraonidae*, in the "systematic" department of the whole Bibliography; though a paper on *Phalaropus hyperboreus* and *Lagopus scoticus* as observed in Great Britain would belong here, being a "faunal" publication, and a "British" one.

This instalment, like those which have preceded it, is to be considered only in the light of published proof-sheets, to be canceled on the final appearance of the whole work. They are thus published in advance for several reasons—among others, both to render available certain departments of the Bibliography which approach completion, and are therefore useful as far as they go, and to invite suggestions and criticisms for the bettering of the whole work. This British list is prepared with the same great care to secure good results which was bestowed upon previous instalments, and it is hoped that the severe tests to which it will doubtless be subjected will prove it to be no less accurate than its predecessors have been found to be. Accurate, as far as it goes, I believe it to be; but I know it to be very incomplete. I do not think that it contains more than one-half as many titles as belong to this department of the Bibliography. I earnestly hope that the omissions, as well as any other defects that publication of my manuscript discloses, may be brought to my notice by those interested in the completion of the work.

There are numberless historical, statistical, geographical, agricultural, even political publications, which contain lists or other notices of British Birds, no hint of the fact being given in their respective titles; and it is my aim to include everything that claims to be ornithological by a formal heading of any sort. Very few of these "by-ways of bibliography" have been accessible to me in America. Nor have I ever been able to lay hands on a file of *The Field*, nor have I indexed certain periodicals past 1874. These sources, to say nothing of others I could mention, should yield upwards of a thousand titles not here given. I am so fully aware of the deficiencies of this instalment that criticism on this score would be futile. My manner of arranging the titles, moreover, is according to the plan of the whole work, scarcely to be appreciated as yet. But these two points aside, I ask for, and hope to receive, the severest criticism to which such literary work can be subjected. I should esteem it a great favor to receive back this pamphlet from its possessor with any errors corrected, any omissions supplied, or any bettering of my comments on the publications the titles of which are here given;

and I should be happy to recognize such courtesy by returning a copy of the whole Bibliography as soon as published.

In conducting this work, I habitually regard THE TITLE as inviolable, —to be transcribed *in full, verbatim, literatim et punctuatim*. In the case of a book, this means a transcript of the title-page, with vertical bars (|) to indicate the adjustment of the typography. With this is given the complete collation. In the cases of papers published in periodicals, I give the full title, with the page on which the article ends as well as that on which it begins, with illustrations if any—in short, all customary or requisite bibliographical data. Different editions of the same work, even if identical, are regarded as separate publications.

Except in certain cases, where the contrary is expressly stated, *no title in this Bibliography has been taken at second-hand*.

Many friends, both in England and in my own country, have been pleased to express their interest in this work, and their hope for its successful completion. To each of them, I beg to tender my sincere thanks; and I may be permitted here to refer, in an especial manner, to the encouragement, advice and assistance which I have constantly received, during years of toil, from Professor Alfred Newton, of Magdalene College, Cambridge.

SMITHSONIAN INSTITUTION,
Washington, January 20, 1880.

1666. MERRETT, C. Pinax | Rerum Naturalium | Britannicarum, | continens | Vegetabilia, Animalia | et | Fossilia, | In hac insulâ repperta in- | choatus. | — | Authore | Christophoro Merrett | Medicinæ Doctore utriusque Societatis Regiæ | Socio primoque Musæi Harveani custode. | — | Μη τῷ λόγῳ μὴνον ἀλλὰ | ἔργῳ δεῖ νομίζεσθαι τοὺς ἕητρος. | Hipp. | — | Londini Impensis Cave Pulleyn Insigne Rosæ | in Cæmeterio Divi Pauli, Typis F. & | T. Warren, Anno 1666. Vol. unie. 16mo. Tit., 1 fol. Epist. dedicat., 3½ fol. Epist. ad Lect., ½10 fol. pp. 1-221 + 1.

Editio princeps. Ed. alt., 1667, q. v. Ed. nova, 1704.

Aves Britannicæ, pp. 170-184.

Avium Catalogus Britannicarum, adjectis nominibus incolarum, locis habitationum, auctor-
umque citationibus, neonon notis diversis.

"As to Animals, he finds of them about 340. kinds in England, whereof of the fourfooted are about 50. Birds 170. . . ." (*Philos. Trans.*, i, p. 364.)

1667. MERRETT, C. Pinax | Rerum Naturalium | Britannicarum, | continens | Vegetabilia, Animalia, | et | Fossilia, | In hac Insula reperta inchoatus. | — | Authore | Christophoro Merrett, | Medicinæ Doctore utriusque Societatis | Regiæ Socio primoque Musæi Har- | veani Custode. | — | Μη τῷ λόγῳ μὴνον ἀλλὰ | ἔργῳ δεῖ νομίζεσθαι τοὺς ἕητρος. Hipp. | — | Londini, | Typis T. Roycroft, Impensis Cave Pulleyn. | MDCLXVII. Vol. unie. 16mo. Tit., 1 fol. Epist. dedic., 5 fol. Epist. ad Lect., 10 fol. pp. 1-223 + 1.

Edit. altera. Ed. princeps, 1666, q. v. Ed. nova, 1704.

Aves Britannicæ, pp. 170-184.

The matter of these two editions is substantially the same, if not identical, but the type appears to have been reset throughout; the title and collation differ, as will be seen on comparing them. The Government Printing Office has no font that will exactly reproduce the Greek quotation of the 1666 ed., though coming very near it; moreover, the orthography and accentuation of the motto differ in the two eds.—The orig. ed. must be very rare; Engelmann does not give it, citing the ed. of 1667 as the first, and noting another of 1704. There is a copy of each of the two earlier eds. in the Phila. Acad. Libr.

1676. P[LOT], R. The | Natural History | of | Oxfordshire, | Being an Essay toward the Natural History | of | England. | — | By R[obert]. P[lot]. LL. D. | [Greek quotation, 3 lines.] | [Engraving.] | Printed at the Theater in Oxford, and are to be had there: | And in London at Mr. S. Millers, at the Star near the | West-end of St. Pauls Church-yard. 1677. | The price in sheets at the Press, nine shillings. | To Subscribers, eight shillings. 1 vol. folio. fly-leaf with imprimatur; title, backed blank, 1 leaf; to Charles II, 1 leaf; to reader, 3 leaves; text, pp. 1-358; errata, 1 leaf; index, 5 leaves; map, and pll. 16.

We have no Greek font that will reproduce the motto of the title.

Chap. VII, Of Brutes. pp. 175-179, ¶ 3-17, relate to Birds, in the author's "learn'd and curious manner." Fig. of a bird, pl. x, f. 3.

1678. MORAY, R. A Description of the Island Hirta. < *Philos. Trans.*, xii, 1678, pp. 927-929.

With reference to the Birds.

1684. SIBBALD, R. Scotia Illustrata, | sive | Prodromus | Historiæ Naturalis | in quo | Regionis natura, Incolarum Ingenia & Mores, Morbi iisque medendi Methodus, & | Medicina Indigena accuratè explicantur; | et Multiplices Naturæ Partus in triplice ejus Regno, Vegetabili scilicet, Animali & Minerali | per hancce Borealem Magnæ Britanniæ Partem, quæ Antiquissimum Scotiæ | Regnum constituit, undiquaque diffusi nunc primum in Lucem eruantur, & | varii eorum Usus, Medici præsertim & Meehanici, quos ad Vitæ | cum necessitatem, tum commoditatem præstant, cunctis | perspicuè exponuntur. | — | Cum figuris æneis. | Opus viginti Annorum | Serenissimi Domini Regis Caroli. II. Magnæ Britanniæ, &c. | Monarchæ Jussu editum. | Auctore Roberto Sibbaldo M. D. Equite Aurato, Medico & Geographo | Regio, & Regii Medicorum Collegii apud Edinbvrgh Socio. | [Fig.] | Edinbvrghi, | Ex Officinâ Typographicâ Jacobi Kniblo, Josuæ Solingensis | & Johannis Colmarii, Sumptibus Auctoris. | — | Anno Domini M. DC. LXXXIV. 1 vol. folio. 5 p. ll., + 3 ll. Pars Secunda specialis, tomus primus, 3 p. ll., pp. 1-114, 3 ll. Pars Secunda specialis, tomus secundus, 3 p. ll., pp. 1-56, 2 ll., pll. 1-22.

Ipsum verò opus prodromum in duas Partes divisum est; Prima Generalis duos continens Libros. Secunda Pars specialis est, et quatuor Libris constat; quorum Tertius de Animalibus Scotiæ tam feris quam domesticis agit; cujus Sectio Tertia de Avibus, pp. 11-22, tractat: Caput I, de avibus in genere; II, de avibus terrestribus carnivoris; III, de avibus granivoris; IV, de arculis; V, de avibus aquaticis fissipedibus; VI, de avibus palmipedibus; VII, de avibus quibusdam, quæ incertæ classis sunt.

1686. PLOT, R. The | Natural History | of | Stafford-Shire. | By | Robert Plot. LL.D. | Keeper of the | Ashmolean Musæum | And Professor of Chymistry | in the | University | of | Oxford. | — | Ye shall Describe the Land, and bring the Description hither to Me. Joshua 8 v. 6. | — | [Engraving.] | Oxford. | Printed at the Theater, Anno M. DC. LXXXVI. 1 vol. folio. Title, backed with imprimatur, 1 leaf; to James II, 1 leaf; preface, 1 leaf; poetry to James II, 2 leaves; to Dr. Plot, 1 leaf; same in Latin, $\frac{1}{2}$ leaf; directions, $\frac{1}{2}$ leaf; index, 1 leaf; text, pp. 1-450; index, 5 leaves; map, and pll. 37.

Chap. VII. Of Brutes, in which the ingenious and curious author considers such as "i. either wholly undescribed, by any Author I have yet met with; or 2. have not been noted by the learned Mr. Willughby or Mr. Ray to be indigenæ of this County; or 3. have had very extraordinary accidents attending them." Birds are treated, ¶ 2-17, pp. 228-236, pl. xix; also pl. xxii, f. 1.

1698. MARTIN, M. A late Voyage to St. Kilda, . . .

Not seen: contains ornithological matter. See the ed. of 1818. There are many eds., in various places; it had reached a 4th in 1753.

1700. LEIGH, C. The | Natural History | of | Lancashire, Cheshire, | and the | Peak, in Derbyshire: | with an | Account | of the | British, Phœnician, Armenian, Gr. and Rom. | Antiquities in these Parts. | — | By Charles Leigh, | Doctor

1700. LEIGH, C.—Continued.

of Physick. | — | Oxford: | Printed for the Author: and to be had there at Mr. George West's, | and Mr. Henry Clement's, Booksellers there; Mr. Edward Evet's, | at the Green Dragon, in St. Paul's Church-yard; and Mr. John | Nicholson, at the King's-Arms, in Little Britain, London. MDCC. 1 vol. sm. folio. frontisp. portrait, eleven prel. ll., pp. [1-4], 1 l., pp. 1-190, 1 l.; Book II, pp. 1-97, 1 l.; Book III, pp. 1-112, 15 ll. Index. Many plates.

Book I, chap. ix, pp. 157-164, Of Birds: summary notice.

1704. MERRETT, C. Britannicarum Rerum Naturalium Pinax, . . . Londini. Roycroft. 1704.

Not seen: title from Engelmann, who, citing the 1667 ed., says that it was reissued in 1704, under the above title. Compare the eds. of 1667 and of 1666.

1709. ROBINSON, T. An | Essay | towards a | Natural History | of | Westmorland | and | Cumberland. | Wherein | An Account is given of their several Mineral | and Surface Productions, with some Dire- | ctions how to discover Minerals by the Ex- | ternal and Adjacent Strata and Upper Co- | vers, &c. | To which is Annexed, | A Vindication of the Philosophical and Theological | Paraphrase of the Mosaick System of the | Creation, &c. | — | By Tho. Robinson, Rector of | Ousby in Cumberland. | — | London: | Printed by J. L. for W. Freeman, at the | Bible against the Middle-Temple-Gate in Fleetstreet, 1709. 1 vol. 8vo. 8 prel. ll., pp. 1-118.

After his paraphrase of Genesis I, the author presents some "moral conclusions" which Birds help him to draw.

1710. SIBBALD, R. History, ancient and modern, of the Sheriffdoms of Fife and Kinross, with the description of both, and of the Firths of Forth and Tay, and the Islands in them. Edinburgh. 1710.

Not seen: said to contain ornithological matter. See the ed. of 1803.

1712. LHUYD, E. A Letter from the late Mr. Edward Lhwyd, Keeper of the Ashmolean Museum in Oxford, to Dr. Tancred Robinson, F. R. S. containing several observations in Natural History, made in his Travels thro' Wales. < *Philos. Trans.*, xxvii, 1712, pp. 462-465.

Notices the Grey and Red Game, Cranes, and some unknown red birds, conjectured to be Virginia nightingales.

1712. LHUYD, E. An Extract from a Letter of Mr. Edw. Lhwyd to Dr. Tancred Robinson; giving some farther Account of the Birds mentioned in the foregoing Letter. < *Philos. Trans.*, xxvii, 1712, p. 466.

Relating to the same scarlet birds, on which, however, no further light is thrown.

1713. RICHARDSON, R. Several Observations in Natural History, made at North-Bierley in Yorkshire, by Dr. Richard Richardson (M. D.) Communicated in a Letter to Dr. Hans Sloane, R. S. Secr. < *Philos. Trans.*, xxviii, 1713, pp. 167-171.

Observations on the "Nut-hatch" or "Nut-jobber" (*Sitta*) and on the nest of *Regulus cristatus*.

1737. ALBIN, E. A Natural History of English Song-Birds, . . .

This is the date of the *original* edition, which I have not seen. There are at least five: see the third, 1759. See also the anonymous piracy, 1791.

1747. ALBIN, E. A Natural History of English Song-Birds, . . .

This is the date of the *second* edition, which I have not seen. There are at least five of them: see the third, 1759. See also the anonymous piracy, 1791.

1759. ALBIN, E. A | Natural History | of | English Song-Birds, | and | Such of the Foreign as are usually brought | over and esteem'd for their Singing. | To which are added, | Figures of the Cock, Hen, and Egg of | each Species, exactly copied from Nature, | By Mr. Eleazar Albin, | And curiously engraven on Copper. | Also | A particular Account how to order the | Canary-Birds in Breeding; likewise their | Diseases and Cure. | — | The third Edition. | — | London: | Printed for C. Ware, at the Bible and Sun, on | Ludgate-Hill.

1759. ALBIN, E.—Continued.

M. DCCCLIX. | Price . . . 1 vol. 8vo. 2 p. ll. (title and preface), pp. 1-96, + 2 ll. (index and advts.), frontisp. and 23 plates.

This was a considerable treatise in its day, going through at least five editions, of which the present is the third. The original was 1737; the second, 1747; the fourth 1776?, Edinburgh; the fifth, 1778; with anonymous piracy, 1791.

1759-63. MARTIN, B. The | Natural History | of | England; | or, | a Description of each particular County, | In regard to the curious Productions of | Nature and Art. | — | Illustrated by a Map of each County, and Sculptures | of Natural Curiosities. | — | Vol. I [II]. | Containing, | . . . | — | By Benjamin Martin. | — | London: | Printed and sold by W. Owen, Temple-Bar, and by the | Author, at his House in Fleet street. | — | MDCCLIX [MDCCLXIII]. 2 vols. 16mo. Vol. I, 1759, pp. i-iv, 1-410 + 8. Vol. II, 6 prel. ll., pp. 1-392. Maps in both vols.

I do not find any ornithology to speak of in either of these vols.

1766. [PENNANT, T.] British Zoology. . . . folio. 1766.

This, which I have not seen, is said to be the original edition of the famous work. Six editions have come to my knowledge, whereof I have handled only the so-called fourth and the later one of 1812. According to my imperfect information these are as follows:

1766. *Editio princeps, ut supra.*

1768 (to 1770?). *Second edition.* 8vo.

1768 (to 1770?). *Third? edition.* (How about this?)

1771-76. *Murr's edition*, in Latin and German. (This is not included in the regular enumeration of the editions.)

1776-77. The so-called "*Fourth*" edition. 4 vols. in two issues, one in 8vo and the other in 4to; copies also differing slightly in the collation of the unpagged leaves, but typography identical.

1812. *Another edition.* 4 vols. 8vo. (First ed. with author's name on the title.)

All of these are noted, or fully given, beyond, at their respective dates.

Cf. J. A. Harvie-Brown, Caperc. in Scotland, 1819, p. 23, note.

1768-70? [PENNANT, T.] British Zoology. . . . 8vo. 1768-70?

See what is said under head of the original folio ed., 1766. Is this the 2d or the 3d ed.? Are there two of this date? See the so-called fourth ed., 1776-77.

1769-72. BERKENHOUT, J. Outlines | of the | Natural History | of | Great Britain | and | Ireland. | Containing | A systematic Arrangement and concise Description of | all the Animals, Vegetables, and Fossiles which have | hitherto been discovered in these Kingdoms. | — | By John Berkenhout, M.D. | — | In Three Volumes. | — | Vol. I [-III]. | Comprehending the Animal [mut. mut.] Kingdom. | — | London: | Printed for P. Elmsley (Successor to Mr. Vaillant) | facing Southampton-street, in the Strand. | M DCC LXIX [M DCC LXXII]. 3 vols. 16mo. Vol. I, 1769, pp. i-xiv, 1-233. (Vol. II, 1770, Botany; Vol. III, 1772, Fossils.)

Class II. Birds. pp. 10-58. A descriptive list of species, in Linnæan system. There is said to be a second edition. There is a third edition, differently titled, 2 vols., 1795, *q. v.*

1769. WALLIS, J. The Natural History | and | Antiquities | of | Northumberland: | And of so much of the County of | Durham | As lies between the Rivers Tyne and Tweed; | commonly called, | North Bishoprick. | In two volumes. | By John Wallis, A. M. | Vol. I [II]. | — | London: | Printed for the Author, by W. and W. Strahan; | and sold by S. Bladon, in Pater-noster-Row. | — | M D CCLXIX. 2 vols. sm. 4to. Vol. I, 2 p. ll., pp. i-xxviii, 2 ll., pp. 1-438, 1 l. Vol. II, 2 p. ll., pp. 1-562, 1-22, 1 l.

Vol. I, Chapter IX. Of Birds. pp. 309-346. The author calls it, in his preface, "short descriptions and synonyms of the most curious birds observed with us, . . . with no other embellishments than those of nature and truth." It treats of some fifty species.

1771-76. [PENNANT, T.] (*Ed. C. G. v. Murr.*) Zoologia Britannica. Class I. Quadrupeda. II. Aves. Latine donavit C. Th. de Murr.—Britische Thiergeschichte. . . . in das Latein. und Deutsche übers. u. mit einigen Anmerkgn. begleitet von C. G. v. Murr. . . . Augsburg. J. Haid und Sohn. 1771-1776. pp. 178, pll. 132.

Not seen: title abridged from Engelmann. Said to be taken from 2 vols. of the 2d ed., 1768.

1771. [TUNSTALL, M.] Ornithologia Britannica: seu Avium omnium britannicarum tam terrestrium, quam aquaticarum Catalogus, sermoni latino, anglico et gallico redditus; cui subjicitur Appendix, Aves alienigenas, in Angliam raro advenientes, complectens. [Auctore Marmaduke Tunstall.] Londini: J. Dixwell. 1771. folio. pp. 4, 1 pl.

Not seen.—I observe late citation of Tunstall as authority for the name *Falco peregrinus*.

1772. RUTTY, J. An | Essay | towards a | Natural History | of the | County of Dublin, | Accommodated to the | Noble Designs of the | Dublin Society; | Affording a summary View [etc., 17 lines.] | — | By John Ratty, M. D. | — | Vol. I [II]. | — | Dublin: printed by W. Sleater, in Castle-street. | For the Author. 1772. 2 vols. 8vo. Vol. I, pp. i-xiv, 1-4, 1-392, pll. i-v. Vol. II, pp. i-vi, 1-488, several folded tables.

Vol. I. Of Birds. pp. 295-344, pll. ii-v. A considerable account, illustrated with 4 folded plates, but of no apparent value.

1775. HAYES, [WM.] A | Natural History | of | British Birds, | &c. | With their Portraits, | Accurately drawn, and beautifully coloured from Nature, | By Mr. [William] Hayes. | London: | Printed for S. Hooper, No 25, Ludgate-Hill, | M. DCCC. LXXV. 1 vol. folio. Title and pp. 1-24, with 47 unnumbered col'd pll.

The following is a list of these plates: 1. Hen harrier. 2. *Falco torquatus*. 3. Sparrowhawk. 4. Kestrel. 5. *Milvus regalis*. 6. Chough. 7. Jay. 8. Magpie. 9. *Picus varius major*. 10. *Picus viridis*. 10*. Wryneck. 11. Lapwing. 12. Sea Plover [*Hæmatopus*]. 11. Turtle. 14. *Turtur torquatus*. 15. Ringdove. 16. *Columba tabellaria*. 17, 18. Cuckoo. 19. Bittern. 20, 21. Pheasant. 22. Gold Pheasant. 23. Bantam Cock. 24. Bernacle. 25. Brent. 26. Tufted Duck, *Glaucium minus*. 27. Shoveller. 28. Shieldrake. 29. *Querquedula minor*. 30. Water hen. 31. Fieldfare. 32. Starling. 33. *Parus longicaudus*. 34. Goldfinch. 35. *Hortulanus arundinaceus*. 36. Bramble finch. 37. Bullfinch. 38. Wren. 38*. Willow wren. 38**. Golden Crested Wren. 38***. Great Titmouse. 38****. Blue Titmouse. 39. Whin Chad (sic). 39*. Stone chatter. 40. Redstart. 40*. Redbreast.—47 plates in all. To some are given quasi-binomial names; but the author is out of the true fold, and his text is worthless. The plates are far from being as bad as some I have seen.

- 1776! ALBIN, E. A Natural History of English Song Birds, . . .

This is the fourth edition, which I have not seen. There are at least five of them: see the third, 1759.

- 1776-77. [PENNANT, T.] British Zoology. | [By Thomas Pennant.] | Vol. I [-IV]. | Class I. Quadrupeds. | II. Birds. | Fourth Edition. | Warrington: | printed by William Eyres, | for Benjamin White, at Horace's Head, | Fleet Street, London. | MDCCCLXXVI [MDCCCLXXVII]. 4 vols. 8vo. Vol. I, 1776, engr. title, 1 l.; pp. i-xxxiv (incl. printed title), 2 ll. (list of plates), pp. 1-152, pll. i-xiv (Mammals); pp. 153-418, pll. xv-lix (Land Birds). Vol. II, 1776, engr. title (=pl. lx), 3 p. ll. (printed title and list of plates), pp. 419-786, pll. lxi-ciii, i-ix, 1 folded sheet of music. (Vol. III, 1776, Reptiles and Fishes. Vol. IV, 1777, Crustacea, Mollusca, and Testacea.)

The orig. ed. was 1766, q. v. The 2d ed. is said to date 1768.—There appears to have been really no 3d ed., but only a second issue of one of the others, doubtless the 2d.

Obs.—It is said that there were two issues of date 1776-77, one in 8vo, the other in 4to, both entitled "Fourth edition". The difference is probably only in the size of the paper, the typography and impression being identical. I find among my slips two titles, both relating to this same 4th ed., but taken at different times from different copies; both "8vo", but the collation not identically the same (there being pp. i-viii and 5 unpag'd leaves in one, not in the other). There are several unpag'd pages in the work, which may be bound in different places in different copies, or left out of some. So I let both titles stand, though they refer to the same edition of the same work. The main text, pp. 1-418 in Vol. I, and pp. 419-786 in Vol. II, together with the plates i-ciii, + i-ix + 1 sheet of music, are absolutely the same. See next title.

It is not easy to cite the title of this work, as every line of it, excepting the first, changes with successive volumes. The eng. titles to Vols. I and II differ again from each other and from the printed titles. The work is ostensibly anonymous, but few authors are better known than Thomas Pennant. This edition, being the fourth, makes many changes in collation from an earlier one. Vols. I and II include the Birds, preceded by the Mammals in Vol. I.

- 1776-77. [PENNANT, T.] British Zoology. | [By Thomas Pennant.] | Vol. I [-IV]. | Class I. Quadrupeds. | II. Birds. | Fourth Edition. | Warrington: | printed by William Eyres, | for Benjamin White, at Horace's Head, | Fleet street, London. | MDCCCLXXVI [MDCCCLXXVII]. 4 vols. 8vo. Vol. I, 1776, eng. title, 1 l., pp. i-xxxiv (incl. printed title), 2 ll., pp. i-viii, 5 ll., pp. 1-418, 4 ll., pll. i-lx. Vol. II, 1776, eng. title (=pl. lx), 3 p. ll. (printed title and list of plates), pp. 419-786, pll. lxi-ciii, i-ix, 1 folded sheet of music. (Vol. III, 1776, and Vol. IV, 1777, do not relate to Birds. Place of publ. changed to "London" in later vols.)

Vol. I, Class II, Birds. Div. I, Land Birds, pp. 153 to end, pll. xv-lx. Vol. II, Class II, Division II, Water-fowl, the whole volume, pll. lx-ciii, and of the appendix pll. i-ix, with the music sheet, pl. lx being the frontispiece or eng. title-page, as you please. The unpag'd leaves at end of Vol. I (in copy examined; they may be bound elsewhere in other copies) are also ornithological. (Compare last title, and see what is said under it.)

Besides the systematic account of the species, there are some pieces requiring mention: Vol. I, pp. 158-160, expl. of technical terms; the unpag'd leaves (ordered to be inserted immediately before the index) are additions and corrections. Vol. II, appendix, pp. 623-626, Birds now extinct in Great Britain, or such as wander there accidentally; also, the bullfinch music sheet. pp. 637-646 of appendix is mammalogical. pp. 647, 648, of the choice of His Majesty's Hawks. pp. 649-659, of the small Birds of Flight, by Daines Barrington. pp. 660-703, Experiments on Singing Birds, by Daines Barrington. pp. 709-723, on the migrations of British Birds. pp. 725-730, Extracts from old English writers. pp. 731-760, Systematic Arrangement of the Birds of Great Britain, with names in the ancient British.

The sheet of music is from *Philos. Trans.*, lxxviii, pl. xi.

1778. ALBIN, E. A Natural History of British Song-Birds, . . .

This is the date of the fifth edition, which I have not seen. See the third, 1759.

1780. [EDWARDS, G.] A | Discourse | on the | Emigration of British Birds: | or, | This Question at last Solv'd: | Whence come the Stork and the Turtle; the | Crane and the Swallow, when they know | and observe the appointed Time of their coming? | Containing | A Curious, particular, and circumstantial Account of the | respective Retreats of all those | Birds of Passage | Which visit our Island at the Commencement of Spring, and | depart at the Approach of Winter; as, the | [etc., 6 lines, in triple columns.] | Also, | A copious, entertaining and satisfactory Relation of | Winter Birds of Passage, | Among which are the | [etc., 2 lines, in triple column.] | Shewing | The different Countries to which they return, the Places where they | breed, and how they perform their Annual Emigrations, &c. | With a short Account of those Birds that migrate occasionally, | or only shift their Quarters at certain Seasons of the Year. | To which are added, | Reflections on that truly admirable and wonderful | Instinct, the Annual Migration of Birds! | — | By a Naturalist [George Edwards]. | — | Salisbury: | Printed and sold by Collins and Johnson, | For the Author. | Sold also by Fielding and Walker, in Pater-noster Row, London. | M DCC LXXX. 1 vol. 8vo. pp. i-vi, 1-45.

There is another ed., 1795.

The title of this work, by one of the most distinguished naturalists of that day, is sufficiently explicit.

1787. LATHAM, J. A List of the Birds of Great Britain; Comprehending all such as either visit us at uncertain Seasons, or are usually domesticated, as well as those which are known to be constant Inhabitants. < *Latham's Gen. Syn. Birds, Suppl.*, i, 1787, pp. 281-298.

Briefly annotated; especially valuable for its indication of the stragglers.

1789. MARSHAM, R. Indications of Spring, observed by Robert Marsham, Esquire, F.R.S. of Stratton in Norfolk. Latitude 52° 45'. < *Philos. Trans.*, lxxix, pt. ii, 1789, pp. 154-156.

Tabular statement of observations upon the appearance, etc., of various birds.

1789. WALCOTT, J. Synopsis | of | British Birds. | — | By John Walcott, Esq. | — | The Works of the Lord are great: | Sought out of all them that have Pleasure therein. | Psalms, cxi. 2. | — | London: | Printed by W. Justins, Shoe-

1789. WALCOTT, J.—Continued.

maker Row, Blackfriars, | For the Author: | And sold by Mess. White and Son, Fleet Street; | Robson and Clarke, New-Bond Street; | And J. Mathews, Strand. | — | M, DCC, LXXXIX. 2 vols. sm. 4to. Not paged; with some 250 illustrations, in the text, not numbered.

There is said to be another edition, 1792. (?)

"The following Work contains the description and manners of nearly all our British birds, with a figure of each, copied by the Author from nature. . . . The particular merit this Work is entitled to, lies in the figures being faithful copies of nature; and that it adds a little to our knowledge of the manners of birds." (*Extract from Preface.*) A few of the plates are copies from Brisson, and others. The author drew most of them from fresh specimens; others from specimens in the Parkinson and Latham museums; the descriptions of these latter being from Latham's "Synopsis." The engravings are of half-page size, heading a page, the rest of the page being text, backed blank; many leaves of generic characters are interpolated. There is no pagination, printer's signature or numeration of the plates. Some 250 species are thus treated, the work thus consisting of as many sheets, plus the interpolated sheets of generic details. The sequence of the species appears to be nearly that of the Linnaean Systema Naturæ, beginning with *Vultur*, and ending with *Caprimulgus*.

1789. [WHITE, G.] The | Natural History | and | Antiquities | of | Selborne, | in the | County of Southampton [by Gilbert White]; | with | Engravings, and an Appendix. | London: | printed by T. Bensley; | for B. White and Son, at Horace's Head, Fleet street. | M. DCC. LXXXIX. 1 vol. 4to. pp. i-vi, 1-468, 7 unnumbered ll. (index and errata). eng. title-p., and 7 copper-pll., besides one in text of p. 307.

Not seen: title from Newton, *Notes and Queries*, 5th ser., vii, Mar. 31, 1877, p. 241; which see, especially, for a bibliography of G. White's published writings.

This is the editio princeps of "White's Selborne"; from which, with or without the "Calendar" and "Observations," which were incorporated in 1802, flow numberless editions, variously edited and modified. I give nearly all of them in this bibliography; but see especially Newton, as just cited.

The famous work is ostensibly anonymous; but the author's name, "Gil. White," appears on p. v. of the "Advertisement". The pl. opp. p. 259 represents *Charadrius himantopus*.

"Many as our English Naturalists have been, and among them men endowed with so much excellence as to ensure their taking and holding a rank not inferior to that enjoyed by the naturalists of any other nation, there is but one whose writings have placed him among English classical authors. This one is Gilbert White; and his best known work, *The Natural History and Antiquities of Selborne*, has only to be named to ensure its respectful if not rapturous reception by all classes."—*Nat.* 13 July, 1720; *ob.* 26 June, 1793.

A summary notice of the editions of Selborne, etc., is given under 1877, NEWTON, A., *q. v.*

The following memoranda give the dates of publication of nearly all of White's published writings, exclusive of the two Swallow papers in *Philos. Trans.*

1789, *Nat. Hist. Ant. Selb.*, orig. ed.—1792, German, ed. *Meyer*.—?1793, *Nat. Hist. Ant.*—1795, *Nat. Calend.*, ed. *Aikins*.—1802, *Works* (*Nat. Hist. Ant. Calend. and Misc. Obs.*), ed. *Markwick*.—1813, Same, with Poems.—?1822 (—? = 1802?)—?1825 ——— ?—1829, *Nat. Hist. Selb.*, ed. *Jardine*.—1829, *Nat. Hist. Selb.*, ed. *Jardine*.—?1830, *Nat. Hist. Ant.*—?—1832, *Nat. Hist. Ant.*, ed. *Jardine*.—1833, *Nat. Hist. Ant.*, notes by several, ed. *Rennie*.—1833, *Nat. Hist.*, ed. *Lady Dover*.—1833, *Nat. Hist. Obs. and Calend.*, ed. *Brown*.—?1833, *Nat. Hist. Ant.*, ed. *Jardine*.—1834, *Nat. Hist. Obs. and Calend.*, ed. *Brown*.—1834, *Jesse's Gleanings*.—?1835, *Nat. Hist. Obs. Calend.*, ed. *Brown*.—1836, *Nat. Hist. Ant. Calend.*, etc., notes by *Blyth*.—1836, *Nat. Hist. Ant.*, ed. *Jardine*.—1837, *Nat. Hist. Ant. Calend. Misc. Obs.*, notes by *Bennett*.—1840, *Nat. Hist.*, etc., ed. *Brown*.—1841, *Nat. Hist.*, ed. *Lady Dover*, American reprint.—1843, *Nat. Hist.*, notes by *Jennys*.—1843, *Nat. Hist.*, etc., ed. *Brown*.—1845, *Nat. Hist.*, etc., ed. *Brown*.—?1851, *Nat. Hist.*, etc., ed. *Jesse*, suppl. *Jardine*.—1853, *Nat. Hist. Ant. Obs. and Calend.*, notes by *Jardine*.—1854, *Nat. Hist.*, etc., notes by *Wood*.—1858, *Nat. Hist.*, etc., ed. *Blyth*.—1860, *Nat. Hist.*, ed. *Lady Dover*, American reprint.—?1860, *Nat. Hist.*, ed. *Lady Dover* (Pub. Soc. Diff. Christ. Knowl.).—1870 or 1871, the same.—1875, *Nat. Hist. Ant.*, etc., ed. *Bennett*, notes by *Harting*.—1875, *Nat. Hist. Ant.*, ed. and notes by *Buckland*.—1876, the same.—1876, Correspondence with Marsham.—1877, *Nat. Hist. Ant.*, etc., 2 vols., ed. *Bell*.—1879, *Nat. Hist. and Calend.*, with notes by *Davies*.—Besides these, there are some half-dozen reissues, separately dated, of the Harper (American) reprint; and I also hear of one or two editions, character unknown to me, between 1876 and 1879.

1791. ANON. (ALBIN, E., *stolen from.*) The | History of | Singing Birds | containing | An exact Description of their | Habits & Customs | & their manner of constructing their nests | their times of Incubation | With the peculiar excel-

1791. ANON.—Continued.

lencies of their several Songs. | the Method of rearing them in Cages | & the preparation and choice of their | Food | Also the disorders they are subject to | with the mode of treatment, | Including the history & management | of | Canary Birds | translated from the | French of the | Count de Buffon. | the whole ornamented with Copper Plates | from Drawings after | Nature, | Edinburgh | Printed for Silvester Doig Royal Exchange | 1791 1 vol. 2 engr. titles; advt., and contents, each one leaf; pp. 1-192; many plates.

This is clearly a "bookseller's book", made out of Albin's "Natural History of English Song Birds", with nearly the same plates, and the text almost word for word in various places, as I ascertain by direct comparison; variously padded in other places. The illustrations are substantially the same, but with the eggs mostly erased from the plates. One may always suspect an anonymous book which parades some great man's name on the title-page, as Buffon's in this case.—Compare 1759, ALBIN, E.

1791-96. LORD, T. Lord's, | Entire New System of | Ornithology. | Or | Oecumenical History, of | British Birds. | [Fig.] | Under the Inspection and Patronage, of the Rev.^d M.^r Peters. | Chaplain, to His Royal Highness the | Prince of Wales. | The whole accurately copied, from the Original Paintings, | now in the possession of the | Artist. | With a brief account of their Characters, & Properties. | The writing Corrected, & Embellish'd, by the | Rev.^d D.^r Dupree. | Master of the King's, Free Grammar School, at | Berkhamstead. | London. | Published as the Act directs, May, 30th 1791 [-1793]. by the Author. | 1 vol. folio. Engr. title, dedication, introduction, pp. i-vi; plates 1-114, with as many sheets of letterpress. Pub. in 38 parts, of 3 plates and sheets each, from May 30, 1791 to Oct. 1, 1796.

Each plate is dated, so that the dates of publication may be ascertained for the whole series—the redeeming feature of the work. Engelmann gives "(96) 108" plates: but I find in the copy examined the series of (3×38=) 114 complete, though some of the sheets are wrongly numbered, being corrected in msc.

Given a snob with an "entire new system of ornithology,"—a royal chaplain for a patron,—and a reverend pedagogue to correct and embellish the text, all together on one engraved title-page—and the infallible result estops criticism. The Canary bird, and some pigeons and poultry, are included in the "Oecumenical History, of British Birds."

1791. MARKWICK, W. On the Migration of certain Birds, and on other Matters relating to the feathered Tribes. < *Trans. Linn. Soc.*, i, 1791, pp. 118-130, pl. xi.

General considerations. Tabular view of the appearance and disappearance of 25 spp. of British Birds, from observations in Sussex, 1768 to 1783; further commentary on the same; special description and orig. fig. of *Tringa glareola*.

1792. WHITE, G. (*German ed., Meyer.*) White's Beyträge | zur | Naturgeschichte von England. | Aus der Englischen übersetzt | und | mit Anmerkungen begleitet | von | Friedrich Albrecht Anton Meyer, | der Weltweisheit und Arzneygelehrtheit Doctor und Privatdocent | zu Göttingen. | Berlin, 1792. | Bey Heinrich August Rottmann. 16mo. pp. 8 (unnumbered), 168.

Not seen: title and comment from A. Newton.

"According to the youthful translator's preface, the original has much chaff (*Sprenu*) in it, but also some corn that is worth transplanting into German soil, which he therefore condescends to extract, warning his readers, however, that the book is not for the learned, but only for such as wish to entertain themselves with a little knowledge. The extracts so put together entirely lose their epistolary character, though the translator keeps up the name. Thus White's first six letters to Pennant are condensed by Meyer into his "Erster Brief," while the last and "Vierzehnter Brief" is compounded of part of White's fifty-eighth to Barriugton, with a single paragraph from his next, and the final paragraph of the whole *Nat. Hist. Selb.* The translation is not very accurate, and the editor's remarks are inserted in the text, between brackets, often with a sneer."

† 1793. WHITE, G. The Natural History and Antiquities of Selborne, . . .

There is said (by Ag. and Strickl., *Bibl.*, iv, p. 560) to be an edition of this year (that of the author's death); "but probably in error", adds Prof. Newton. It may be a misprint for 1792, the date of the German ed., which Ag. and Strickl. do not give, unless this be intended for it.

- 1794-96.** BOLTON, J. *Harmonia Ruralis*; | or, | an Essay | towards | a Natural History | of | British | Song Birds. | — | Volume the first [second]. | — | Illustrated | with Figures of the Size of Life, of the Birds, Male and Female, | in their most natural Attitudes; | their Nests and Eggs, Food, favourite Plants, Shrubs, Trees, &c. &c. | Faithfully drawn, engraved, and coloured | after Nature. | By the Author, | on forty [forty] copper-plates. | — | [Quotation, 4 lines.] | — | *Natura semper eadem, sed Artes sunt variae.* | — | By James Bolton. | — | [Design.] | Printed for and sold by the author, at Stannary, near Halifax; | sold also by B. and J. White, in London, and may | be had of all other booksellers. | 1794 [1796]. 2 vols. folio or 4to. Vol. I, 1794, frontisp., pp. i-viii, 1-40 col'd pll., with 1-40 sheets of text. Vol. II, 1796 (some verbal modifications in the title), 3 p. ll. (title, dedication, and note), 41-80 col'd pll., with 41-80 sheets of text, and pp. 81, 82 (Index).

There are said to be other editions, of 1824 and 1845.

This is perhaps the most ornate, or luxurious, work on British Song Birds of the last century, and it ought to remain in some sort a "standard" treatise, notwithstanding N. Wood's fiat. The text is prepared with great care for accuracy, and the plates are highly coloured—too highly, in fact. They would not be tolerated now, but we should always remember dates, for other than purely bibliographical purposes.

- 1794-95.** DONOVAN, E. *The | Natural History | of | British Birds*; | or, a | selection of the most rare, beautiful, and interesting | Birds | which inhabit this country: | the descriptions from the | *Systema Naturæ* | of | Linnæus; | with | general observations, | either original, or corrected from the latest | and most esteemed | English Ornithologists; | and embellished with | Figures, | drawn, engraved, and coloured from the original specimens. | — | [Vol. I—] Vol. II. | — | By E. Donovan. | — | London: | printed for the author; and for F. and C. Rivington, | No. 62, St. Paul's Church-Yard. 1794 [1795]. 2 vols. in one. 8vo. Vol. I, 1794, 9 p. ll. (title, advt., contents), pp. [3]–[16] and many more unpaged leaves, pll. 1-24. Vol. II, 1795, title and many unpaged leaves, pll. 25-48.

This is a well known and notable treatise, not common now. It was probably published in parts; but of this I do not know. The text is general, being in fact a description or other account of the species of British Birds selected for illustration. The plates are very good considering the date of their publication; in fact they still look well. There are 48 of them, all coloured.

- 1795.** BERKENHOUT, J. *Synopsis | of the | Natural History | of | Great-Britain and Ireland.* | Containing | a systematic arrangement | and | concise description | of all the | Animals, Vegetables, and Fossils, | which have hitherto been discovered | in these Kingdoms. | — | By John Berkenhout, M. D. | — | Being a | third edition of *The Outlines*, &c. | corrected and considerably enlarged. | — | Vol. I [II]. | Comprehending the Animal and Fossil [the Vegetable] Kingdoms. | — | London: | Printed for T. Cadell, and sold by T. Cadell, junior, | and W. Davies, (Successors to Mr. Cadell) | in the Strand, | MD CC XCV. 2 vols. 16mo. Vol. I, 1 p. l., pp. i-xii, 13-334. (Vol. II, Botany.)

Orig. ed. 1769-72, q. v. The second ed. I have not seen.

Class II, Birds. pp. 10-54, substantially the same as in the orig. ed.

- 1795.** [EDWARDS, G.] A | Discourse | on the | Emigration of British Birds; | or, | This Question at last Solv'd: | Whence came the Stork and the Turtle, the | Crane and the Swallow, when they know and | observe the appointed Time of their Coming? | Containing | A curious, particular, and circumstantial Account of the | respective Retreats of all those | Birds of Passage, | Which visit our Island at the Commencement of Spring, | and depart at the Approach of Winter; as the | [etc., 6 lines, in triple columns]. | Also, | A copious, entertaining, and satisfactory Relation of | Winter Birds of Passage: | Among which are the | [etc., 2 lines]. | Shewing the different Countries to which they retire, the | Places where they breed, and how they perform their | Annual Emigrations, &c. | With a short Account of those Birds, that migrate occasionally,

1795. [EDWARDS, G.]—Continued.

or only | shift their Quarters at certain Seasons of the Year. | To which are added, | Reflections on that truly admirable and wonderful Instinct, the | Annual Migration of Birds! — | By a Naturalist [George Edwards]. — | London: | Printed for J. Walker, No. 44, Paternoster-row. | 1795. 8vo. in size, but only 4 ll. to a sig. Title-p., pp. v-xv, 1 p. advt., pp. 1-64.

This is a later issue: orig. ed. 1780. To judge by the make-up of the copy handled, it may be only other copies of the original, furnished with new title-leaf; for after the title-leaf, which is backed blank, comes unpagged p. v, then paged p. vi.—The contents of the treatise are sufficiently indicated in the title. Much space is devoted, in particular, to the migration and alleged hibernation of Swallows, the allegation being discussed and refuted. The author's eminence, no less than his treatment of the subject, makes this a very notable tract. It has become a rare and valuable book. My copy is copiously annotated by a hand unknown to me; it was presented to me in 1879 by S. S. Haldeman, and contains some msc. of his on the fly-leaf.

1795. WARNER, R. The | History | of the | Isle of Wight, | Military, | Ecclesiastical, Civil, & Natural: | — | to which is added, | a view of its agriculture. | — | By the Rev. Richard Warner; [Etc., 16 lines.] — | Southampton. | Printed for T. Cadell, jun. and W. Davies, (successors to Mr. Cadell) in the Strand, London; | and T. Baker, Southampton. — | MDCCXCV. 1 vol. 8vo. pp. i-xiv, 1-312; 2 leaves of coins; appendix, pp. 1-14; 1 l. errata; 9 ll. index.

Chap. IV. Of the Ornithology of the Isle of Wight. pp. 225-246. A considerable account, particularly of the water-fowl.

1795. WHITE, G. (*Ed. Aikin, J.*) A | Naturalist's Calendar, | with | Observations in various branches | of | Natural History; | extracted from the papers | of the late | Rev. Gilbert White, M. A. | of Selbourne, Hampshire, | Senior Fellow of Oriel College, Oxford. | — | Never before published. | — | London: | printed for B. and J. White, Horace's Head, | Fleet Street. | — | 1795. 1 vol. Sm. 8vo or 16mo. pp. i-iv (title and advt., by J. Aikin), pp. 5-170, + 3 ll. (contents and advt.), with coloured frontisp. ("a hybrid bird", in other copies said to face p. 65).

Copy in the Phila. Acad. Library, handled by me.

"THE Reverend Mr. White, so agreeably known to the public by his *Natural History of Selborne*, left behind him a series of yearly books, containing his diurnal observations on the occurrences in the various walks of rural nature, from the year 1768 to the time of his death in 1793. From these annals he had already extracted all the matter comprised in the work above mentioned, down to the middle of 1787, but several curious facts in the preceding numbers had not been thus employed; and all the subsequent ones remained untouched. It was thought a mark of respect due to his memory, and to the reputation he had acquired as a faithful and elegant observer, not to consign these relics to neglect. The manuscripts were accordingly put into my hands for the purpose of selecting from them what might seem worthy of laying before the public. The present small publication is the fruit of my research. . . ." (Editor's advertisement.)

The "Calendar" and "Observations" were thus originally printed as a separate book, but were incorporated in many of the subsequent editions of the *Nat. Hist. Ant. Selborne*.

It contains the following bird-matter: "Observations on Birds": pp. 57-91.—Birds in general—Rooks—Thrushes—Poultry—Hen Partridge—A hybrid Pheasant (frontisp. or opp. p. 65)—Land Rail—food of the Ring Dove—Hen Harrier—Great Speckled Diver, or Loon—Stone Curlew—Smallest Willow Wren—Fern Owl or Goat Sucker—Sand Martins—Swallows, congregating, and disappearance of—Wagtails—Wryneck—Grosbeak. This matter comes in the part of the book entitled "Observations on various parts of nature", following the "Calendar".

1797-1804. BEWICK, T. History | of | British Birds. | The Figures engraved on wood by T[homas]. Bewick. | Vol. I [II]. | Containing the | History and Description of Land [Water] Birds. | Newcastle: | printed by Sol. Hodgson, for Beilby & Bewick: sold by them, | and G. G. and J. Robinson, London. | [Price 18s. in Boards.] | 1797 [1804]. 2 vols. 8vo. Vol. I, Land Birds, 1797, pp. i-xxx (title, preface, introduction, contents), 1-335, figg. 115. Vol. II, Water Birds, 1804, pp. — — —, figg. 113.

I have seen few editions of "Bewick", and for the titles of most of them, as well as for nearly all that I have to remark respecting them, I am indebted to Prof. A. Newton, in *epist.*

1797-1804. BEWICK, T.—Continued.

Vol. I, Land Birds, 1797, of the *editio princeps*, originally appeared in two issues. Vol. II, Water Birds, 1804, appeared in one issue of a number of copies equal to the number of copies of both issues of Vol. I. The text of Vol. I is by Beilby; that of Vol. II by Bewick. The two vols. are thus really two separate works; but as they both together make up the *editio princeps*, I have combined the titles of the two in one, hypothetically; not knowing, however, that the title of Vol. II may not be worded more differently from that of Vol. I than as indicated above. The bracketed statement of price, in the title, no doubt varies in different copies. Also, was not Vol. II printed by E. Walker? Vol. I is said to contain 115 figures; Vol. II, 113; making 228 in all. About 50 of the figures are said to have been drawn from subjects in the Wycliffe Museum.

It appears that there have been eight regular editions of "Bewick" (exclusive of three editions of the cuts alone). They are as follows:

1797-1804. *Editio princeps, ut supra.*

1805. *Second Edition.* Newcastle. E. Walker. 2 vols. 8vo.

1809. *Third Edition.* Newcastle. E. Walker. ?

1806. *Fourth Edition.* Newcastle. E. Walker. 2 vols. 8vo.

1821. *Fifth Edition.* Newcastle. E. Walker. 2 vols. 8vo. (With Supplement, Part I, Land Birds, and Supplement, Part II, Water Birds.)

1826. *Sixth Edition.* Newcastle. E. Walker. 2 vols. 8vo.

1832. *Seventh Edition.* Newcastle. C. H. Cook. 2 vols. 8vo.

1847. *Eighth Edition.* Newcastle. J. Blackwell & Co. 2 vols. 8vo. (With Synopsis, by J. Hancock.)

"Supplements", one to each vol., were introduced with the 5th ed., 1821. Each successive edition, or each to the 6th, has accessions; thus, the 6th, 1826, contains 300 (157 Land, 143 Water) figures of British Birds, besides 14 of exotic Land Birds.

The separate issues of figures only are three in number, viz:

1800. *First issue.* Cuts of Land Birds only, without text. 8vo. (How many copies?)

1817. *Second issue.* Cuts of Land and Water Birds, without text. 4to. (25 copies.)

1825. *Third issue.* Cuts of Land and Water Birds, without text. . . . (100 copies.)

There is an autobiographical memoir of Bewick. Cf. *Ibis*, iv, 1862, pp. 368—.

All these editions, both of the text, and of the plates only, are duly noted in the present Bibliography, under their respective dates, *which see*, for further particulars.

1797. LAMBERT, E. Observations relating to the Migration of [certain British] Birds. < *Trans. Linn. Soc.*, iii, 1797, pp. 12-15.

Notes on the movements of 9 spp.

1797. MATON, W. G. Observations | relative chiefly to the | Natural History, | Picturesque Scenery, | and | Antiquities, | of the | Western Counties of England, | Made in the Years 1794 and 1796. | — | Illustrated by | A Mineralogical Map, and sixteen Views in Aquatinta by Aiken. | — | By William George Maton, M. A. | Fellow of the Linnæan Society. | — | Vol. I [II]. | — | Salisbury, | printed and sold by J. Easton; | [etc., 3 lines.] | — | 1797. 2 vols. 8vo. Vol. I, pp. iii-xii, 1-336, 8 plates. Vol. II, pp. 1-216, 8 ll. (index, &c.), 7 plates, map.

Notices of various birds, *passim*.—See especially the *Critical Review*, Apr., 1793, pp. 369-378, and June, 1798, pp. ———.

1798. ANON. Observations relative chiefly to the Natural History, Picturesque Scenery, and, . . . By William George Maton. . . . < *Critical Review*, Apr., 1798, pp. 369-378; also June, 1798, pp. ———.

A review of Maton's book, 1797. The anonymous writer slashes the author with great severity, and in a tone of pique and ill-humor savoring of personal antipathy. Mr. Maton's remonstrance met with no mercy in 'answers to correspondents' in the June number of the *Review*.

1798. MARKWICK, W. Aves Sussexienses; or, A Catalogue of Birds found in the County of Sussex, with Remarks. < *Trans. Linn. Soc.*, iv, 1798, pp. 1-30, pl. 1.

175 spp. marked whether summer or winter, or casual bird of passage, or resident. Extended commentary on many of the species. Pl. I, *Tringa maritima*.

1798. MONTAGU, G. Descriptions of three rare Species of British Birds. < *Trans. Linn. Soc.*, iv, 1798, pp. 35-43, pl. 2.

Sylvia sylvicola, p. 35, pl. 2, f. 1 (egg). *Tringa nigricans*, p. 40, pl. 2, f. 2. *Alauda petrosa*, p. 41, pl. 2, f. 3 (egg).

- 1799? ANON. Our [British] Song Birds. | [Quotation, 8 lines.] | London: | Religious Tract Society, | Instituted 1799. 1 vol. 24mo (32 pages to a signature). pp. 1, 2 (advs.), i-vi, 7-192.

One of the monthly issues of the Society named. The date at the bottom need not be that of publication, though the book is named in the advt. as No. 5 of the "issue of the first year". But it may mean the first year in which they published these tracts, not that of the existence of the Society. The book does not look to me like so old a one as 1799.

1799. PULTENEY, R. "Catalogues of the Birds, Shells and rare Plants of Dorsetshire, from the new and enlarged ed. of Mr. Hutchins History of that County, by Rd. Pulteney, M. D. fol. 1799."

Not seen.

1800. BEWICK, T. [Figures of British Land Birds. 1 vol. 8vo. Newcastle. S. Hodgson. 1800.]

Not seen. I know not what title to give this, if any. It is a set of the cuts (figures of Land birds and vignettes), from Vol. I of the "History of British Birds", issued without text. See 1797-1804, BEWICK, T.

1802. MONTAGU, G. Ornithological Dictionary; | or, | Alphabetical Synopsis | of | British Birds. | By | George Montagu, F. L. S. | In two volumes. | Vol. I [II]. | London: | printed for J. White, Fleet street, | by T. Bensley, Bolt Court. | 1802. 2 vols. 8vo, not paged. Vol. I, plate of Cirl Bunting, title-leaf, pp. i-xliv, and sheets B to Y (near 400 pages). Vol. II, 2 title-pages, sheets B to Y, and erratum slip.

Vol. I has the Introduction, and the Dictionary A to L, inclusive; Vol. II, Dictionary M to Y, and Appendix in the letter S; also, "a List of British Birds, systematically arranged into ordines, genera, and species," occupying 17 pages, and a catalogue of the principal authors referred to.

This is the *ed. princeps*, and the only one in 2 vols. There is a Supplement, Exeter, 1813; a 2d ed., Rennie, 1831; a 3d ed., Newman, 1866. It is one of the most notable of treatises on British Birds, as a *vade mecum* which has held its place at a thousand elbows for three-quarters of a century.

Colonel Montagu died June 20, 1815.

1802. WHITE, G. (*Ed. Markwick.*) The Works, | in | Natural History, | of the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | Comprising | the Natural History of Selborne; | the Naturalist's Calendar; | and Miscellaneous Observations, | Extracted from his Papers. | To which are added, | A Calendar and Observations, | By W. Markwick, Esq., F. L. S. | In Two Volumes. | London: printed for J. White, Fleet Street, | by T. Bensley, Bolt Court. | 1802. 2 vols. 8vo. Vol. I, pp. i-viii, 1-392, pll. 2. Vol. II, pp. 1-330, pll. 2, col'd, representing *Charadrius himantopus* (frontisp.), and "a hybrid bird" (to face p. 173, wrongly lettered 123).

Not seen: title and comment from Newton, 1877, *q. v.*

This is often quoted as Aikin's or Markwick's ed., but the advt. is signed "J. W[white]", the author's nephew, and gives a brief sketch of his life. The "Antiquities" are omitted; the "Calendar" and enlarged "Observations" are included. See the orig. ed., 1789; the orig. ed. of the "Calendar" and "Observations", 1795; also the ed. of 1813.

1803. SIBBALD, R. The | History, | ancient and modern, | of the Sherifffdoms of | Fife and Kinross, | with a description of both, | and of the | Firths of Forth and Tay, | and the islands in them; | [etc., 4 lines.] | With an account | of the natural products of the | Land and Waters. | By | Sir Robert Sibbald, M. D. | — | [Quotation, 2 lines.] | — | A new edition, | with notes and illustrations. | — | Embellished with elegant engravings. | — | Cupar-Fife: | — | Printed by and for R. Tullis, the publisher; | [etc., 4 lines.] | London. | — | 1803. 1 vol. 8vo. pp. i-xvi, 1-468, 3 ll., 4 engravings.

Date of an earlier ed. is 1710. Compare same author, 1684.

Chap. III.—Concerning the Animals or living Creatures in these two Firths; of which pp. 106-115 are devoted to birds, giving a general notice of a few species of sea-fowl. Of those species not described by Sibbald, the editor adds a short notice, with Linnæan and English names from Pennant.

1804. BEWICK, T. History of British Birds. . . . Vol. II. Water Birds. 8vo. 1804.
This is the date of Bewick's second volume, published seven years after the first. See 1797-1804. BEWICK, T.
1804. MONTAGU, G. Observations on some Species of British Quadrupeds, Birds, and Fishes. < *Trans. Linn. Soc.*, vii, 1804, pp. 274-294.
Cirl Bunting, Dartford Warbler, Ringed Plover, Black-headed Gull, miscellaneous notes on, including habits, plumages, &c.
1805. BEWICK, T. A | History | of | British Birds. | — | The Figures engraved on wood by T. Bewick. | — | Vol. I [II]. | Containing the | History and Description of Land Birds [Water Birds]. | — | [Cut.] | — | Newcastle: | printed by Edward Walker, for T. Bewick; sold by him, and | Longman and Rees, London. | — | 1805. 2 vols. 8vo. Vol. I, pp. i-xxxviii, 1-346. Vol. II, pp. i-xxii, 1-400. Numberless cuts in both vols.
This is the second edition: I have handled it. See the orig. ed., 1797-1804.
1806. GRAHAME, J. The | Birds of Scotland, | with other | Poems. | By | James Gra-hame. | — | Edinburgh: | Printed by James Ballantyne & Co. | for Longman, Hurst, Rees, and Orme, Paternoster-row. | London; and William Blackwood, South Bridge | Street, Edinburgh. | 1806. 1 vol. Sq. 24mo. prel. title, 1 leaf; pp. 1-7 (title and preface); contents, 1 leaf; text, pp. 1-248.
Birds of Scotland, in 2 Parts to p. 83, and some other bird-poems; the rest miscellaneous.
1807. SIMMONDS, T. W. Observations respecting a Species of Phalarope, and some other rare British Birds. < *Trans. Linn. Soc.*, viii, 1807, pp. 234-269.
Phalaropus williamsii, sp. n., p. 264 [= *hyperboreus*], and miscellaneous notes on 11 other British Birds.
1807. TURTON, W. British Fauna, | containing | a Compendium | of | The Zoology | of the | British Islands: | arranged according to the | Linnean System. | — | By W. Turton, M. D. F. L. S. | — | Vol. I. | Including the classes | Mammalia, Birds, Amphibia, | Fishes, and Worms. | — | [Quotation, 4 lines.] | — | Swan-sea: | printed by J. Evans, Wind-street. | — | 1807. 1 vol. 18mo. or sm. 12mo., pp. 1-230, i-viii.
No more published. This author's incompetent performances with Linnaeus and Gmelin are well known. The present volume has no more authority than that attaching to the same person's English version of the *Systema Naturae*.
Class II, Aves. Birds. pp. 18-77. A descriptive systematic list of 294 spp.
1808. MONTAGU, G. Some interesting Additions to the Natural History of Falco cyaneus and pygargus, together with Remarks on some other British Birds. < *Trans. Linn. Soc.*, ix, 1808, pp. 182-199.
F. cyaneus; *F. cinerareus*, p. 188; *Sylvia dartfordiensis*, with notes on 4 spp. rare British Birds.
1808. MONTAGU, G. Some interesting Additions to the Natural History of Falco cyaneus and pygargus, together with Remarks on some other British Birds. < *Tilloch's Philos. Mag.*, xxxii, 1808, pp. 315-329.
From *Linn. Trans.*, ix, 1808, pp. 182-199, q. v.
1809. BEWICK, T. History of British Birds. . . .
The third edition, not seen by me. See the original, 1797-1804.
1809. MARTIN, M. A voyage to St. Kilda. By M. Martin, Gent. < *Pinkerton's Voy.*, iii, 1809, pp. 700-729.
This is from the fourth ed., London, 1753, 8vo.
- 1811-1821. GRAVES, G. British Ornithology: | being | The History | with a coloured representation | Of every known Species of | British Birds. | — | By George Graves, assisted by several eminent ornithologists [mut. mut.]. | — | Vol. I [-III]. | — | London: | printed for the author, | by Stephen Couchman, Throg-morton-street [mut. mut.], | and sold by | Sherwood, Neely, and Jones, Pater-noster-row. | — | 1811 [1813, 1821]. 3 vols. 8vo. Vol. I, 1811, not paged, 48 col'd plates. Vol. II, 1813, not paged, 48 col'd plates. Vol. III, 1821, not paged, 48 col'd plates.

1811-1821. GRAVES, G.—Continued.

Impressed with the conviction that most previous works on British Birds had not "taken the necessary pains to mark out the different species", and being in possession of a considerable number of excellent drawings executed for the late William Curtis, the author submitted these pages to the public.

1812. PENNANT, T. British Zoology, | by | Thomas Pennant, Esq. | A New Edition. | In Four Volumes. | Vol. I [-IV]. | — | Class I. Quadrupeds. | II. Birds. Div. I. Land. | [Div. II. Water.] | — | London: | printed for Wilkie and Robinson; [and eleven other booksellers.] | — | 1812. 4 vols. 8vo. Vol. I, prel. title, 1 l.; engr. title, 1 l.; printed title, 1 l.; pp. i-xlvi (dedication, preface, &c.); pp. 1-188, pll. i-xiv (mammals); pp. 189-568, pll. xv-lxvi (Land Birds). Vol. II, eng. title, pp. i-viii (incl. titles), pp. 1-452, pll. i-xlviii (Water Birds). (Vol. III, Reptiles and Fishes. Vol. IV, Crustacea, Mollusca, Testacea.)

This is supposed to be the 5th edition (not counting Murr's Latin-German version); 4th, 1776-7; 3d and 2d, both 1768-70; 1st, 1766, *qq. vv.*—It is notable as the first edition in which the author's name appears on the title. The pagination is entirely different from that of earlier eds., and the pll. are renumbered.

1813. BULLOCK, W. An Account of four rare Species of British Birds. < *Trans. Linn. Soc.*, xi, pt. i, 1813, pp. 175-178.

Strix nyctea, *Tringa calidris*, *Hirundo* (?) *pratensis*, *Anas africana*.

1813. LOW, G. Fauna Orcadensis: | or, | the Natural History | of the | Quadrupeds, Birds, Reptiles, and Fishes, | of | Orkney and Shetland. | By | the Rev. George Low, | Minister of Birsay and Haray. | — | From a Manuscript in the possession of Wm. Elford Leach, M. D. F. L. S. &c. | — | Edinburgh: | printed by George Ramsay and Company, | for Archibald Constable and Company, Edinburgh; and for Longman, | Hurst, Rees, Orme, and Brown,—and White, Cochrane, and Co. | London. | — | 1813. 1 vol. 4to. pp. i-xvi, 1-230.

Class II, Birds. pp. 31-152. Thus more than half the work is devoted to ornithology. It is a systematic treatise on the subject, in due form, and has the appearance of being a valuable contribution.

"Mr Low's merits, as a laborious and accurate observer of Nature, were, it is believed, scarcely known beyond the narrow circle of his particular friends; and it is to be regretted, that a recent historian* [the Rev. George Barry, D. D. in his History of Orkney, 4to. 1805.] has not scrupled to avail himself of the advantages which this obscurity offered to a plagiarist. It having been the Editor's fortune to procure the MS. *Fauna Orcadensis* of Mr Low, he now begs leave to lay it before the public, in the form in which it was left by its Reverend Author. It appears to have been revised by the late Mr PENNANT, as it contains a few corrections in that gentleman's handwriting. The Editor trusts that it will be found to afford an interesting and valuable addition to the Natural History of the British Islands, and prove far more useful than the closet compilations of some modern zoologists." (*Extr. from Editor's Preface.*)

1813. MONTAGU, G. Supplement | to the | Ornithological Dictionary. | or | Synopsis of British Birds. | — | By George Montagu, Esq., F. L. S. & M. W. S. | — | Printed by S. Woolmer, Exeter; | [etc., 7 lines.] | — | 1813. 1 vol. 8vo. Not paged; title, 1 leaf, backed blank=pp. i, ii; introduction, pp. iii-vi; list of plates, 1 leaf; text, sheets B to Ff. (about 472 pages); 1 page errata; with 24 full-page plates.

Eleven years after the appearance of his celebrated Dictionary, Montagu issued this Supplement, in similar style and spirit. It runs through the alphabet, A to Y, as before (sheets B to Bb.). Then an appendix retraces the alphabet again, A to S (to sheet Ff.). Following is Definition of the parts of extraordinary tracheæ belonging to some species of aquatic birds, with a plate; and Direction for amputating the Wing of a Bird in a Menagerie. A "Catalogue of additions and alterations to be made in the original list of British Birds", &c., finishes the volume. It is illustrated by 24 plates—23 of birds, 1 of anatomical details.

Sterna anglica, sp. n., first page of sheet Y, with a plate. Also, *Ardea lentiginosa*, sp. n.

1813. WHITE, G. (*Ed. Markwick.*) The | Natural History | of | Selborne. | by the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | To which are added, | The Naturalist's Calendar, | Miscellaneous Observations, and Poems. | A New Edition, with engravings. | In two volumes. | London: | printed for White, Cochrane, and Co. | Longman, Hurst, Rees, Orme, and Brown; | J.

1813. WHITE, G.—Continued.

Mawman; S. Bagster; J. and A. Arch; | J. Hatchard; R. Baldwin; and | T. Hamilton. | 1813. 2 vols. 8vo. Vol. I, pp. i-viii, 1-352, pl. 3. Vol. II, pp. 1-364.

Not seen: title and comment from Newton, 1877, *q. v.*

"The plate of *Charadrius himantopus* has been re-engraved, and is not coloured; that of the 'Hybrid Bird' is omitted. With these exceptions and those of the change of the title, and the addition of the 'Poems' and of 'Observations on some Passages of Mr. White's *Natural History of Selborne*' (vol. ii, pp. 307-316), signed 'J. M.' (Mitford, cf. Bennett's ed., 1837, pref. pp. xiv, xv), this edition differs but little from that of 1802, *q. v.* Bennett indeed says (*loc. cit.*) that it was published in 4to. I have not met with such a copy, but some may very likely have been printed in that form."

1815-22. HUNT, J. British Ornithology; containing portraits of all the British Birds, including those of foreign origin which have become domesticated; drawn, engraved and coloured by John Hunt. Norwich. 1815-1822. 8vo. Pub. in 15 parts, each of 12 pl. col'd.

Not seen.

1816. BEWICK, T. A | History | of | British Birds. | — | The Figures engraved on wood by T. Bewick. | — | Vol. I [II]. | containing the | History and Description of Land [Water] Birds. | — | [Cut.] | — | Newcastle: | printed by Edward Walker, for T. Bewick: sold by him, and | Longman and Co. London. | — | 1816. 2 vols. 8vo. Vol. I, pp. i-xxxviii, 43-330. Vol. II, pp. i-xxii, 19-362. Numberless cuts of birds, scenery, tail-pieces, &c., in each volume.

This is the fourth edition; handled by me. See the orig. ed., 1797-1804.

1816. GRAVES, G. Ovarium Britannicum; | being | a correct delineation | of | The Eggs | of such | Birds | as are natives of, or domesticated in | Great Britain. | — | By | George Graves, F. L. S. | Author of British Ornithology, &c. | — | London: | Printed for the Author, and sold by Sherwood, | Neeley, & Jones, Paternoster-Row, and | J. Harding, St. Jame's-Street. | — | 1816. 1 vol. 8vo. pp. i-vi, with 15 coloured plates.

It is a mere fragment of a work never completed. The text is nothing more than the title, preface and list of the plates, on which the eggs of 46 British Birds are figured in colors.

1816. LEACH, W. E. Systematic Catalogue of the Specimens of the indigenous Mammalia and Birds that are preserved in the British Museum, with their localities and authorities. To which is added, a list of the described species that are wanting to complete the collection of British Mammalia and Birds. London. 1816. 4to.

Not seen! It is a very scarce tract; I know of no copy in America. It acquires importance from the many new names, generic and specific, or new compounds of old names, which it contains. Stephen's Continuation of Shaw's *Gen. Zool.*, 1817, *et seq.*, gives various new names of Leach's, some cited as if from his MS.

1816. SHARP, C. History of Hartlepool. . . . By Sir Cuthbert Sharp. 1816.

Not seen.—Contains "A List of Birds observed at Hartlepool": 68 spp. See the reprint, 1851.

1817. BEWICK, T. [Figures of British Land and Water Birds. 4to. 1817.]

Not seen.—I know not what title to give this, if any. It is said to be a set of the cuts from both vols. of the "History of British Birds", without the text, and printed in 4to, in an edition of only 25 copies. See 1797-1804, Bewick, T.

1817 (*prior to*). FORSTER, E., Jr. Catalogue of British Birds, . . .

Not seen.

1817. FORSTER, T. A | Synoptical Catalogue | of | British Birds; | intended | to identify the species mentioned by different names | in several catalogues already extant. | Forming | a book of reference to observations | on | British Ornithology. | — | By Thomas Forster, F. L. S. | Corresp. Memb. Acad. Nat. Sciences at Philadelphia. | &c. &c. | — | London: | printed by and for Nichols, Son, and Bentley, | Red Lion Passage, Fleet-street. | 1817. 1 vol. 8vo. pp. i-iv, 1-64.

Several copies I have handled differ (immaterially) in collation: thus, some begin with 4 pp. of advs., and end with 2 pp. of advs.; some have a leaf of advs. interpolated between

1817. FORSTER, T.—Continued.

p. 38 and p. 39, others not. The regular pagination is simply i-iv, 1-64; pp. i, ii, title-leaf; pp. iii, iv, preface; pp. 1-64, text. The "Synoptical Catalogue" runs pp. 1-37 (38 blank), giving 283 spp., under 55 genera, with author's names in Roman capitals, Leach's names opposite in Roman lower case, and vernacular synonyms under both. Then follows, p. 39, "Observations on British Ornithology. Article I. Division and Arrangement of British Genera and Species of Birds, with references to plates; serving for reference to the descriptive part intended to follow." Such caption implies that the work is a fragment; for nothing follows.

The author having found Dr. W. E. Leach's Catalogue of 1816 difficult to use, on account of the newness of many names, he thought that a Catalogue with Leach's and more customary names put together would be useful; hence this work. Some of the names here given are curious; for the author says: "I have attended to generic and specific differences, and thereon founded a nomenclature, regardless of modern names, whenever they appeared to disagree with facts; but at the same time adhering as much as possible to the views of Aristotle, *Ælian*, Pliny and others of the ancient writers."—On the use of *Bubo ignavus*, p. 3, cf. *Ibis*, 1879, p. 349; *Ann. Mag. Nat. Hist.*, Aug., 1879, p. 159.

1817. PITT, W. A | topographical | History of Staffordshire; | including its | Agriculture, Mines, and Manufactures. | Memoirs of eminent natives; | Statistical tables; | and every species of information connected with the local | history of the county. | With a succinct account of the rise and progress of the | Staffordshire Potteries. | — | Compiled from the most authentic sources, | By William Pitt, | [etc., 2 lines.] | — | Newcastle-under-Lyme: | printed by and for J. Smith, | [etc., 4 lines.] | — | 1817. 1 vol. 8vo. pp. i-xxvi, 1-450, 5 unpaginated leaves of tables, pp. [1-319], 1 p. errata, 8 ll. index.

Contains, pp. [145-158], a formal list of birds, annotated.

1817. YOUNG, G. A | History | of | Whitby, | and | Streoneshalh Abbey; | with a | statistical Survey of the vicinity | to the | Distance of Twenty-Five miles: | By the Rev. George Young, . . . Vol. II. | — | Whitby: | printed and sold by Clark and Mead, . . . 1817. 8vo.

Vol. II.—III. Zoology. II. Birds; pp. 797, 798; a paragraph, of no consequence.

1818. MARTIN, M. A | Voyage | to | Saint Kilda, | The remotest of all the Hybrides, | or | Western Islands of Scotland; | [etc., 15 lines.] | — | By M. Martin, Gent. | — | Printed in the year MDCXCVIII. | — | Glasgow; | re-printed for John Wylie & Co. | By R. Chapman. | — | 1818. 12mo. pp. i-iv, 5-77.

Forming one of the tracts in *Miscellanea Scotica*, Vol. II; orig. ed., 1698, q. v. It contains, pp. 26-36, a considerable account of wild fowl, as "Gairfowl", Solan Goose, Fulmar, etc.

1820. ATKINSON, J. A Compendium | of the | Ornithology | of | Great Britain | with a reference to the | Anatomy and Physiology of | Birds. | — | By John Atkinson, F. L. S. | Member of the Royal College of Surgeons in London, &c. | Curator of the Museum, and Librarian to the Philosophical and | Literary Society at Leeds. | — | "Milvus in cælo cognovit tempus snum; turtur, et | hirundo, et ciconia custodierunt tempus adventus | sui." Jer. — | — | London; | printed for Hurst, Robinson and Co. No. 90 Chapside; and | Robinson and Co. Leeds. | — | 1820. 1 vol. 8vo. pp. i-xii, 1-232.

A systematic descriptive synopsis, with occasional anatomical matter; appendix, on taxonomy.

"The intention of the author, in forming this compendium, was to collect the information scattered through extensive treatises, and the transactions of learned societies,—to state the species which have been recently discovered,—and to correct those errors in synonyma, which the difference of feather in different ages, or at certain times in the year, has frequently produced." (*Extr. from Preface.*)

1820. [EDITORIAL.] [Notice of the proposed publication of] Selby's Natural History of British Birds. < *Edinb. Philos. Journ.*, iv, 1820, p. 210.

1821. BEWICK, T. A | History | of | British Birds. | The Figures engraved on wood by T. Bewick. | Vol. I [II]. | Containing the | History and Description of Land [Water] Birds; | and | a Supplement, with additional figures. | Newcastle: | printed by Edward Walker, Pilgrim Street. | for T. Bewick: sold by him, and E. Charuley, Newcastle: | and Longman and Co. London. | 1821.

1821. BEWICK, T.—Continued.

2 vols. 8vo. Vol. I, Land Birds, pp. i–xl (title, preface, introduction and contents), 1–330, figg. —. Vol. II, Water Birds, pp. i–xxii (title, preface, introduction and contents), 1–360, figg. —.

A | Supplement | to the | History | of | British Birds. | The Figures engraved on wood by T. Bewick. | Part I [II]. | Containing the | History and Description of Land [Water] Birds. | Newcastle: | printed by Edward Walker, Pilgrim Street, | for T. Bewick: sold by him, and E. Chanley, Newcastle; | and Longman and Co., London. | 1821. 8vo. Part I, Land Birds, title-p., and pp. 1–46, 1 p. (contents), figg. —. Part II, Water Birds, title-p., and pp. 1–43, 1 p. (contents), figg. —.

Not seen: title obligingly furnished by Prof. A. Newton, in epist.

This is the *fifth* edition, notable for the introduction of a separately full-titled and separately paged "Supplement" to each vol. See the orig. ed., 1797–1804.

1821. GRAVES, G. British Ornithology, . . .

There is said to be a "2d. edit." of this date. Is it anything more than the final issue of the whole work, in 3 vols.? Compare 1811–21, GRAVES, G.

1821. MACGILLIVRAY, W. List of Birds found in the district of Harris, part of the outer range of the Hebrides. < *Edinb. Philos. Journ.*, v, 1821, pp. 257–261.

About 87 spp., classed according to localities they frequent, preceded by general observations on the subject.

1821–34. SELBY, P. J. Illustrations of British Ornithology, . . . 2 vols. Elephant folio. Edinburgh. Pub. in 19 Parts. 1821–1834. Vol. I. Land Birds. Vol. II. Water Birds. Said to be 228 plates, of 383 figures, plain or coloured.

Not seen as published at these dates. See 1841, same author. For text, see 1825, 1825–33, and 1833.

There is great difficulty in arriving at the dates of this work. I have handled a complete set of the plates, but that one is dated 1841, being thus a reissue; it is furnished with a new title-page, worded differently from any of the earlier titles. I have not been able to see the work in the parts in which it appeared, nor even as first issued on its completion in 1834. According to information accessible to me (including Lizars' own advt. sheets, pub. with *Nat. Libr.*, Vol. I, 1833), these folios were published in 19 parts, at intervals of about six months, from 1821 to 1834, both inclusive. This gives the date of each, approximately. They form two series: I. Land Birds, in 8 parts; II. Water Birds, in 11 parts; designed to form two vols. On their completion, in 1834, the series were bound in two vols., with a title said to run as follows:

"The Figures of British Birds, containing an exact and faithful representation, in their full natural size, of all the known species found in Great Britain," etc.

The two series together are said to consist of 228 plates, of 383 figures; but they are numbered in such a slovenly manner, with so numerous interpolations, including some lettered instead of numerated, that the number can only be ascertained by actual count. (See the enumeration which I give under date of the reissue, 1841.)

1822. EDMONSTON, L. Remarks on the Larus Parasiticus or Arctic Gull; and on the Larus Rissa or Kittiwake; with an Account of the Greenland Kittiwake;—and on Colymbus Grylle. < *Edinb. Philos. Journ.*, vii, 1822, pp. 90–105.

Chiefly on the habits of these birds.

1822. "[H.]" The History of British Birds; the Figures engraved on Wood, by T. Bewick; and a Supplement with additional Figures. < *Thomson's Ann. of Philos.*, new ser., iv, 1822, pp. 294–308.

A notice of the 5th ed. of the work, followed by an annotated catalogue of the species.

1822? WHITE, G. The Natural History and Antiquities of Selborne. . . . 2 vols. 4to. 1822.

Not seen: is there any such ed.? Given by Engelmann, *Bibl.*, i, p. 202: most likely a mistake—perhaps a typographical error for 1802, *q. v.* Cf. Newton, 1877.

1823. FLEMING, J. Gleanings of Natural History, gathered on the Coast of Scotland during a voyage in 1821. < *Edinb. Philos. Journ.*, viii, 1823, pp. 294–303; ix, 1823, pp. 248–254; x, 1823, pp. 95–101.

Very slightly ornithological; the second article has nothing on birds; the third notices *Alca impennis*, living, from St. Kilda.

1823. SWEET, R. The | British Warblers. | — | An | account of the genus | *Sylvia*; | illustrated by | six[teen] | beautifully colored figures, | taken from | Living Specimens in the Author's Collection; | with | directions for their treatment according to the | author's method; | in which is explained, | how the interesting & fine singing birds belonging | to this genus may be managed, | and kept in as good health as any common | birds whatever. | — | By Robert Sweet, F. L. S. | Author of *Hortus Suburbanus Londinensis*. Botanical Cultivator, | Geraniaceæ, British Flower Garden, &c. &c. | — | The Drawings by E. D. Smith. Artist for the Geraniaceæ. | — | London: | published for the author, | by W. Simpkin and R. Marshall, | Stationers'-Hall Court, Ludgate Street. | 1823. | — | Tilling, printer, Grosvenor Row, Chelsea. 1 vol. 8vo. Title, pp. 1-24. + 14 unpagued pages, + 6 unpagued pages, pll. 1-16.

After the title and six pages devoted to the genus *Sylvia*, come 16 plates, each with its leaf (2 pages) of text, paginated only to p. 24; then 14 unpagued pages belonging to the last 7 plates, and then 6 pages of "Additional Remarks". The sixteen species treated and figured are: 1, *Sylvia rubetra*. 2, *S. phoenicurus*. 3, *S. luscinia*. 4, *S. hortensis*. 5, *S. cinerea*. 6, *S. trochilus*. 7, *S. hippolais*. 8, *S. sylviella*. 9, *S. atricapilla*. 10, *S. sylvicola*. 11, *S. provincialis*. 12, *S. locustella*. 13, *S. phragmitis*. 14, *S. arundinacea*. 15, *S. ænanthe*. 16, *S. rubicola*. These, of course, do not all belong to the genus *Sylvia*, as now understood. The plates are numbered to correspond with the figures here given. The mistake on the title-page is notable; it must have pleased the author to see his 16 plates cut down to 6!

1823. [SYME, P.] A | Treatise on British | Song-Birds. | Including | observations on their natural habits, manner of incubation, &c. with remarks on | the treatment of the young and | management of the old birds | in a domestic state. | With | fifteen Coloured Engravings. | [By Patrick Syme.] | John Anderson, jun. Edinburgh, | 55, North Bridge-street; | and Simpkin & Marshall, London. | — | MDCCCXXXIII. 1 vol. 8vo. pp. i-vi, 1-231, 15 coloured plates. Treating of 33 species of thrushes, larks, starlings, warblers, finches, buntings, etc.

1824. BLACKWELL, J. Tables of the various species of periodical Birds observed in the neighbourhood of Manchester; with a few remarks tending to establish the opinion that the periodical birds migrate. < *Mem. Lit. and Philos. Soc. Manchester*, 2d ser., iv, 1824, pp. 125-150.

Not seen.

1824. [EDITORIAL.] Notice regarding the Island of Grimsey, off the North Coast of Iceland, and the Isles of St. Kilda, on the North-West Coast of Scotland. < *Edinb. Philos. Journ.*, xi, 1824, pp. 132-140.

More particularly the latter; considerable notice of the birds.

1824. FLEMING, J. Remarks illustrative of the Influence of Society on the Distribution of British Animals. < *Edinb. Philos. Journ.*, xi, 1824, pp. 287, 305.

1824. NASH, J. A | practical Treatise | on | British Song Birds; | in which is given | every information relative to their | Natural History, Incubation, &c. | Together with | the method of rearing and managing both | old and young birds. | By Joseph Nash. | — | Illustrated with Engravings. | — | London: | printed for Sherwood, Jones, and Co. | Paternoster-row; | Sold by Joseph Nash, 39, Great Windmill-Street, | Haymarket. | — | 1824. 1 vol. 12mo. pp. i-vi, 1 l., pp. 1-102, with pp. 1-28 of advts., and 8 col'd pll.

Treating 21 spp., several of which are figured in colours. "I do not profess to offer the following treatise as showing either elegance of thought, or purity of diction, but merely as the result of many years' experience, which, from time to time, I have put together at my leisure moments."

1825. BEWICK, T. [Figures of British Land and Water Birds, 1825.]

Not seen: title hypothetical, upon information furnished by A. Newton. It is a set of the cuts of both vols. of the "History of British Birds," without any text, printed in an edition of 100 copies. See 1797-1804, BEWICK, T.

1825. COLE, J. The | History and Antiquities | of | Ecton, | in the | County of Northampton. | By John Cole, | Editor of 'Herveiana,' &c. | [Quot., 3 lines.] | Scarborough: | published by John Cole; and | Longman, Hurst, Rees, Orme,

1825. COLE, J.—Continued.

Brown, and Green, | London. | 1825. 1 vol. 16mo size, 4to by sigs.; frontisp., title, dedic., each 1 leaf; preface, pp. i-iv; text, pp. 1-60; index, pp. i-iv; a few cuts in text.

Four "scarce birds shot at Ecton", p. 43; with note on Royston Crow.

1825. DONOVAN, E. The Natural History of the Nests and Eggs of British Birds. . .

< *Féruss. Bull.*, 2^e sect., v, 1825, pp. 271, 272.

Prospeetus de cet ouvrage.

1825. LESSON, R. P. Notice sur la rencontre de quelques Oiseaux rares en Angleterre; par M. W. Yarrell. . . < *Féruss. Bull.*, 2^e sect., vi, 1825, p. 413.

Extrait du *Zoolog. Journ.*, avril 1825, pp. 24-27.

1825. SELBY, P. J. Illustrations of British Ornithology, . . . Vol. I. Text. 8vo. Edinburgh. W. H. Lizars. 1825.

Not seen.

This is the date of the original edition of the letter-press of Vol. I, Land Birds, being the text to Series I, Land Birds, of the elephant folio plates.

A second edition of this, "remodelled" and "with additions", was issued in 1833, when Vol. II, completing the text of the work, appeared.

See next title. See also 1833, SELBY, P. J.

1825-33. SELBY, P. J. Illustrations of British Ornithology. . . Vols. I. and II. Text. 8vo. Edinburgh. W. H. Lizars. 1825 and 1833.

Not seen.

These are the dates of the two editions of Vol. I, Land Birds, and of the only edition of Vol. II, Water Birds, of the letter-press to the elephant folio plates. Vol. I is thus of two dates: orig. ed., 1825; 2d ed., 1833. Vol. II has but one date: 1833, *which see*.

These 8vo vols. of letter-press, though belonging to, are not to be confounded with, the 2 vols. of elephant folio plates, namely, in 19 semi-annual parts, dating 1821-1834, *which see*.

1825. VIGORS, N. A. A description of a new Species of *Scolopax* lately discovered in the British Islands; with observations on the *Anas gloecitans* of Pallas, and a Description of the Female of that Species. < *Trans. Linn. Soc.*, xiv, pt. iii, 1825, pp. 556-562, pl. xxi.

Scolopax sabini, sp. n., p. 557, pl. xxxi. The *Querquedula* very fully treated with history, synonymy, and characters.

1825. VIGORS, N. A. Ornithology. < *Zool. Journ.*, i, 1824, pp. 589, 590.

Instances of occurrence of *Merops apiaster*, *Pastor roseus*, *Bombycilla bohemica*, *Oriolus galbula*, and *Tantalus igneus* in Ireland.

1825. WHITE, G. The Natural History and Antiquities of Selborne, . . .

"An edition is ascribed to this year by Jardine (introd. p. vii to his ed. of 1829), but it is not mentioned in his account in his ed. of 1853; and though the statement of an 1825 ed. is also made by Bennett in his ed. of 1837, it is probably an error." See Newton, 1877.

1825. YARRELL, W. Notice of the Occurrence of some [16 spp.] rare British Birds. < *Zool. Journ.*, ii, 1825, pp. 24-27.

1826. BEWICK, T. A | History | of | British Birds. | By | Thomas Bewick. | Vol. I [II]. | Containing the | History and Description of | Land [Water] Birds. | Newcastle: | Printed by Edw. Walker, Pilgrim-Street, | for T. Bewick; sold by him, Longman and Co. London; | and all Booksellers. | 1826. | 2 vols. 8vo. Vol. I, Land Birds, pp. i-xliv (title, preface to the sixth edition, the original preface, introduction, technical terms and contents), 1-382, figg. —. Vol. II, Water Birds, pp. i-xxii (title, preface, introduction and contents), 1-432, figg. — (pp. 422-432 being devoted to figures of "Foreign Birds").

Not seen: title from Prof. A. Newton, in epist.

This is the *sixth* edition: The number of illustrations it contains is said to be 300 of British (157 Land, 143 Water) Birds, besides 14 of Exotic Birds. See the orig. ed., 1797-1804.

1826. [CROSTHWAITE, D.] Catalogue | of | Crosthwaite's | Museum. | — | Keswick: | printed by Thomas Bailey. | — | 1826. 1 vol. 18mo. pp. 66.

- 1826-27? DONOVAN, E. The Natural History | of the | Nests and Eggs of British Birds; | The | Descriptions, | which are calculated for the naturalist as well as for the general observer, | Are intended to comprehend every useful Trait of Information respecting the Nidification, Eggs, and Incubation of | the numerous Species of the Feathered Tribes that inhabit the British Isles: | and are throughout accompanied by | A Series of elegantly-coloured Plates, | comprehending figures | of the eggs of every species, with their most singular varieties, so far as they can be correctly ascertained. | The whole exclusively executed from Nature, and disposed according to their respective genera, | by E. Donovan, F. L. S. W. S. &c. | Author of the Natural History of British Birds, in ten volumes, and other approved works. | — | London: | printed for the author, and sold by all booksellers. | 1826. Oblong roy. 8vo, unpagcd, with unnumbered col'd plates. Pub. in Parts.

I have only seen the first four parts of this curiously gotten up affair—was it ever completed? There is some regular text, in double column, but much of the print consists of labels pasted on blank pages opposite the several plates, the execution of which calls for no special remark. Parts 1-3 are dated 1826, but some of the plates themselves are dated 1825; part 4 is not dated. I doubt that anything appeared before 1826; the prospectus was only issued in 1825 (*Féruss. Bull.*, v, pp. 271, 272). Prospectus announces intended completion in 24-36 parts. See *Loudon's Mag.*, ii, 1829, p. 205.

1826. SELBY, P. J. Catalogue of the various Birds which at present inhabit or resort to the Farn Islands, with Observations on their habits, &c. < *Zool. Journ.*, ii, 1826, pp. 454-465.

18 spp., with synonymy.

1826. SHEPPARD, R., and WHITEAR, W. A Catalogue of the Norfolk and Suffolk Birds; with Remarks. < *Trans. Linn. Soc.*, xv, pt. i, 1826, pp. 1-61.

Very fully annotated. Followed by a table of migration of summer birds (18 spp.) from 1812 to 1821.

1827. BRACKENRIDGE, G. W. Yearly appearance of the Swallow and Cuckoo [1801-1826, near Bristol]. < *Zool. Journ.*, iii, 1827, p. 319.

1827. HOGG, J. Natural History of the Vicinity of Stockton. . . . By John Hogg. 1827.

Not seen.—Contains an extended list of the Birds "frequenting the country near Stockton"; 126 spp. The same article is said to have appeared as an appendix to Brewster's history of that town.

1827. JENYNS, L. Observations on the Ornithology of Cambridgeshire. < *Trans. Cambr. Philos. Soc.*, ii, pt. ii, 1827, pp. 287-324.

Not seen.

1827. YARRELL, W. On the occurrence of some [9 spp.] rare British Birds. < *Zool. Journ.*, iii, 1827, pp. 85-88.

1827. YARRELL, W. Some Observations on the Anatomy of the British Birds of Prey. < *Zool. Journ.*, iii, 1827, pp. 181-189, pl. vi.

1828. — — —. Memorandum from the Right Honourable the Lord President, containing some facts relating to the Natural History of the Swallow and Part-ridge. < *Edinb. New Philos. Journ.*, iv, 1828, pp. 290-292.

1828. ANON. Sur quelques oiseaux rares de la Grande-Bretagne: par W. Yarrell[1]. < *Féruss. Bull.*, 2^e sect., xiv, 1828, p. 116.

Extrait du *Zool. Journ.*, iii, 1827, pp. 85-88.

1828. FLEMING, J. A History of British Animals, exhibiting the descriptive characters. . . . 1 vol. 8vo. Edinburgh, 1828.

Not seen.

"Prior to 1828 the only complete hand books of British Ornithology were the valuable but somewhat obsolete 'Ornithological Dictionary' of Montagu, and the fascinating, though not always accurate, 'British Birds' of Bewick. In the above year appeared the 'British Animals' of Dr. Fleming, a work which had no small share in introducing into this country the improved systems of modern zoology. The genera adopted are for the most part those of Cuvier's 'Règne Animals', and the specific descriptions and remarks, though brief, are in general accurate." (*Strickl., Rep. Brit. Assoc. for 1844*, p. 181.)

1828. FOX, G. T. Notice of the appearance of some rare Birds of England. < *Zool. Journ.*, iii, 1828, pp. 491-497.
Falco lagopus, *Cursorius isabellinus*, *Gallinula baillonii*, *Procellaria leachii*, *Anas gambensis*, *A. rutila*, *Vultur fulvus?*, *Sylvia suecica*.
1828. LESSON, [R. P.] Catalogue de divers Oiseaux qui appartiennent à la Faune des îles Farn, avec quelques observations sur leurs habitudes; par [P.] J. Selby.
Féruss. Bull., 2^e sect., xiii, 1828, p. 433.
 Extrait du *Zool. Journ.*, ii, 1826, p. 454.
1828. PITHIE, —. Sea Birds, &c. of the Isle of May. < *Edinb. New Philos. Journ.*, vi, 1828, pp. 189, 190.
 Merely a note alluding to the arrival and departure of some species.
1828. YARRELL, W. On the occurrence of some rare British Birds. < *Zool. Journ.*, iii, 1828, pp. 497-500.
Lestris pomarinus, *Upupa epops*, *Procellaria leachii*, *Sylvia dartfordiensis*, *Emberiza hortulana*, *Podiceps rubricollis*, *Larus minutus*.
1829. "A. C. R." Donovan's Eggs of British Birds. < *London's Mag. Nat. Hist.*, ii, 1829, p. 205.
 A bibliographical note. Nothing heard of the work after Feb., 1827.
1829. "A. C. R." Birds on the Sea Coast of Gornie, in Aberdeenshire. < *London's Mag. Nat. Hist.*, ii, 1829, pp. 392-394.
1829. BLACKWALL, J. Manchester Museum. < *London's Mag. Nat. Hist.*, ii, 1829, pp. 273-275.
 Notice of a few of the rarer British Birds in the collection, with remarks on the habits of some of them.
1829. BLACKWALL, J. Extracts from a Zoological Journal, kept at Crumpsall Hall, near Manchester. < *Zool. Journ.*, v, 1829, pp. 10-14.
 Nidification of some British Birds; roosting of Fieldfares on the ground: anecdote of Falcon and Pigeon.
1829. "CORRESPONDENT." Notice of the Arrival of some of the Winter Birds of Passage, as well as of a few of the occasional Visitants in the Neighborhood of Carlisle, during the Winter of 1828-1829; with Observations, &c. < *Philos. Mag.*, vi, 1829, pp. 110-114.
1829. "CORRESPONDENT." Table of the Arrival of some of the Summer Birds of Passage in the Neighborhood of Carlisle, during the Years 1827 and 1828; with Observations, &c. < *Philos. Mag.*, v, 1829, pp. 196-198.
1829. "CORRESPONDENT." Notice of the Arrival of Twenty-four of the Summer Birds of Passage in the Neighborhood of Carlisle, during the Year 1829; with Observations, &c. < *Philos. Mag.*, vi, 1829, pp. 276-281.
1829. HUNT, J. A | General History | of the | County of Norfolk, | intended | to convey all the information | of a Norfolk Tour, | with the more extended details of | antiquarian, statistical, pictorial, architectural, | and | Miscellaneous Information; | including | biographical notices, | original and selected. | — | Volume I [-III]. | — | [Quotation, 7 lines.] | — | Norwich: | printed by and for John Stacy. | London: | sold by Longman, Rees, Orme, Brown, and Green. | MDCCCXXIX. 3 vols. 16mo.
 The introduction to Vol. I contains a "List of Birds", which we are informed is contributed to the work by John Hunt, taxidermist, of Norwich, editor of an illustrated work on British Birds then in course of publication. The present list runs from p. lix to p. lxxii, and is annotated throughout.
1829. JENNINGS, J. Ornithology of the Metropolis. < *London's Mag. Nat. Hist.*, ii, 1829, p. 264.
 Notes on a few birds observed in London, England.
1829. "J. D. M." Rare Birds killed in different Parts of Ireland. < *London's Mag. Nat. Hist.*, ii, 1829, pp. 394, 395.
1829. LEYLAND, R. Rare Birds observed in the Neighborhood of Halifax, in Yorkshire. < *London's Mag. Nat. Hist.*, i, 1829, pp. 395, 396.

1829. SALMON, J. D. British Birds' Eggs. < *London's Mag. Nat. Hist.*, ii, 1829, p. 205.
Query and answer respecting Graves' *Ovarium Britannicum*.
1829. SHEPPARD, R., and WHITEAR, W. Ein Catalog der Vögel in Norfolk und Suffolk, nebst Bemerkungen, von R. Sheppard und W. Whitear. (Linn. Trans. Vol. XV, P. 1, 1826, p. 1.) < *Oken's Isis*, Bd. xxii, 1829, pp. 1089-1097.^e
Abkürzung: „Von den Bemerkungen Können wir nur das Wesentliche ausheben.“
1829. STANLEY, J. Birds in the Neighbourhood of Whitehaven, Cumberland. < *London's Mag. Nat. Hist.*, ii, 1829, pp. 275, 276.
Mere mention of many species.
1829. VIGORS, N. A. Beschreibung einer neuen Gattung *Scolopax* [Sabini] der britischen Inseln, und des Weibschens von *Anas gloecitans*, von N. A. Vigors. (Linn. Transact. xiv. 3. p. 556.) Gelesen 1824. < *Oken's Isis*, Bd. xxii, 1829, pp. 1107-1109.
1829. WHITE, G. (Ed. Jardine.) The | Natural History | of | Selborne. | By the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | With additions | by | Sir William Jardine, Bart. F.R.S.E. F.L.S. M.W.S. | Author of "Illustrations of Ornithology." | A new Edition. | Edinburgh: | printed for Constable and Co. | and Hurst, Chance, and Co. London. | 1829. 1 vol. 12mo. pp. i-xvi, 1-343.
N. B.—There may be some little confusion respecting the two titles I give of the 1829 Jardine edition: one of them formed Vol. XLV of Constable's *Miscellany*: the other apparently did not; which is which?
1829. WHITE, G. (Ed. Jardine.) The | Natural History | of | Selborne. | By the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | With additions | by Sir William Jardine, Bart. Edinburgh: | printed for Constable and Co. | and Hurst, Chance, and Co. London. | 1829. | "Six pages of Introduction, 330 pp. of text."
Not seen: title from Newton in epist. to Coues, from J. Dixon in epist. to Newton.
This formed Vol. XLV of "Constable's *Miscellany*." The frontisp., supposed to represent White in his study, on the floor of which "Timothy", the tortoise, is crawling, has no apparent connection with the subject. No other illustrations are introduced; the "Calendar," "Observations," and "Poems" are omitted.
1829. "W. J." Rare Birds shot in Dumfries-shire. < *London's Mag. Nat. Hist.*, ii, 1829, pp. 282, 283.
2 spp. of *Scolopacidæ*, 2 of *Phalaropodidæ*.
1830. ANON. Tableau sur l'arrivée de quelques oiseaux d'hiver dans les environs de Carlisle, pendant les années 1827 et 1828; par . . . < *Féruss. Bull.*, 2^e sect., xxii, 1830, p. 120.
Philos. Mag., August, 1829, pp. 110-114.
1830. ANON. Tableau sur l'arrivée de quelques oiseaux d'été dans les environs de Carlisle, pendant les années 1827 et 1828; par . . . < *Féruss. Bull.*, 2^e sect., xxii, 1830, p. 120.
Philos. Mag., March, 1829, pp. 196-198.
1830. "C." Notice of the Arrival of Twenty-four of the Summer Birds of Passage in the Neighborhood of Carlisle, during the Year 1829, with Observations, &c. < *London's Mag. Nat. Hist.*, iii, 1830, pp. 172-174.
1830. "CORRESPONDENT." Notice of the Arrival of Twenty-six of the Summer Birds of Passage in the Neighborhood of Carlisle, together with some of the scarcer Species that have been met with in the same Vicinity during the Year 1830; with Observations. < *Philos. Mag.*, viii, 1830, pp. 444-449.
- 1830-31. DROSIER, R. Account of an Ornithological Visit to the Islands of Shetland and Orkney, in the Summer of 1828. < *London's Mag. Nat. Hist.*, iii, 1830, pp. 321-326; iv, 1831, pp. 193-199.
1830. FOX, G. [T.] Beyträge zur britischen Fauna. < *Oken's Isis*, Bd. xxiii, 1830, pp. 1239, 1240.
Zool. Journ., 1828, iii, pp. 491-497, q. v.

1830. HOY, J. D. Rare Birds, killed during the Autumn and Winter of 1829 and 1830, in Suffolk, and on the Borders of Norfolk and Essex. < *Loudon's Mag. Nat. Hist.*, iii, 1830, p. 436.
With list of some early arrivals in Spring of 1830.
1830. HURST, J. C. Birds (some of them rare) shot and collected in the immediate Vicinity of Dartford, during the last Winter. < *Loudon's Mag. Nat. Hist.*, iii, 1830, p. 435.
1830. JACKSON, C., COUCH, J., and LAKES, J. Rare or uncommon Birds observed in Cornwall, particularly in the southern parts of the county. < *Loudon's Mag. Nat. Hist.*, iii, 1830, pp. 175-177.
1830. SELBY, P. J. Verzeichniss der Vögel, auf den Farn-Inseln an der Nordküste von Northumberland 55½° N. B. < *Oken's Isis*, Bd. xxiii, 1830, pp. 1057-1060.
Zool. Journ., Nro. viii, Januar 1826 (Vol. II), p. 454.
1830. STANLEY, J. Birds in the Neighbourhood of Whitehaven. < *Loudon's Mag. Nat. Hist.*, iii, 1830, pp. 171, 172.
Nominal list.
1830. WHITE, G. (Ed. Jardine.) The Natural History and Antiquities of Selborne. . . . London. 1830. 12mo.
Not seen; not cited by Newton, 1877. Such an ed. is cited by Ag. & Strickl., *Bibl.* iv, p. 561. Any eds. of the 'Jardine' in 12mo or 18mo, from 1829 to 1836, are probably reprints or mere reissues of the Constable ed. of 1829.
1830. YARRELL, W. Vorkommen einiger seltner britischer Vögel. < *Oken's Isis*, Bd. xxiii, 1830, pp. 830, 831.
Aus der *Zool. Journ.*, Vol. II, Nr. 5, Apr., 1825, pp. 24-27.
1830. YARRELL, W. Ueber das Vorkommen einiger seltenen britischer Vögel. < *Oken's Isis*, Bd. xxiii, 1830, pp. 1150, 1151.
Zool. Journ., No. ix, Vol. II, 1827, pp. 85-88, und Vol. III, No. xii, 1828, pp. 497-500, q. v.
1830. "Z. Z." Facts and Queries as to Birds in the West of Scotland. < *Loudon's Mag. Nat. Hist.*, iii, 1830, p. 194.
1831. ACTON, E. List of scarce Birds killed in Suffolk since the Autumn of 1827. . . . < *Loudon's Mag. Nat. Hist.*, iv, 1831, p. 163.
1831. ANON. Notices respecting New Books. < *Philos. Mag.*, x, 1831, pp. 370-379, 429-433, —?
Marked to continue; no more found. An elaborate review of Rennie's ed. of Montagu's *Orn. Dict.* Mr. Rennie is mercilessly assailed.
1831. BLOXHAM, A. Land Birds met with at Sea, on a Voyage from England to South America, in the Years 1824-5. < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 145, 146.
1831. BREE, W. T. The Resident and Visiting Birds of Renfrew [England] and its Neighbourhood. < *Loudon's Mag. Nat. Hist.*, iv, 1831, p. 464.
1831. "D. S." and "J. D." [Review of J. Rennie's edition of Montagu's Ornithological Dictionary.] < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 422-426.
1831. FAYRER, —. [On the Passage of Birds between Scotland and Ireland.] < *P. Z. S.*, i, 1831, p. 145.
1831. GOULD, J. [Exhibition of *Thalassidroma pelagica* and *Lestris pomarinus* from England.] < *P. Z. S.*, i, 1831, p. 151.
1831. HEADLAM, E. Birds shot in the Winter of 1829-30, at Greenhow, North Shields [England]. < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 448, 449.
Nominal list.
1831. "H. N." Birds at and near Londonderry [Ireland]. < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 269, 270, 452, 453.
1831. [MAIN, J.] Some Account of the British Song Birds. < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 118-124, 412-420.

1831. MONTAGU, G. (*Ed. Rennie, J.*) Ornithological | Dictionary | of | British Birds. | By Colonel G. Montagu, F. L. S. | Second edition. | With | a plan of study, and many new articles and original | observations. | By James Rennie, A. M., A. L. S., | Professor of Natural History, King's College, London; Author of "Insect Architecture," "Insect | Transformations," Architecture of Birds, &c. | London: | Hurst, Chance, and Co. St. Paul's, Church-yard. | — | 1831. 1 vol. 8vo. 1 p. l., pp. i-lx, 1-592, numberless cuts.

This edition differs from the first in the dispersion of the original Introduction through the volume in alphabetical order of subjects treated; in substitution of a new Introduction (pp. i-lx) which presents a "Plan of study", discusses various systems very pointedly, and gives an eclectic List of works recommended, their authors being classified as 1) rudimental, 2) literary, 3) philosophic, naturalists; in very considerable alterations in the arrangement of the body of the work: in addition of much new matter marked between asterisks; in alphabetical index of scientific names; and changes of five names, viz: *Anorthura*, p. 6; *Nyctichelidon*, p. 33, gg. un.; *Fringilla spiza*, p. 78; *Motacilla lotor*, p. 377; *Corvus predatorius*, p. 429; *Anorthura communis*, p. 570, spp. un. *Anorthura* and *Nyctichelidon* are proposed as substitutes for *Troglodytes* and *Caprimulgus* respectively, on the ground of the inapplicability of the latter names.

Supposing a new edition of Montagu to have been advisable, I must confess that I do not see that Rennie did not edit it in a satisfactory manner, or why the critics attacked him so promptly and so pointedly. See *Philos. Mag.*, x, 1831, pp. 370-379, 429-433; *Loudon's Mag.*, iv, 1831, pp. 422-426, and 516-520.

1831. NICHOLLS, J. Birds in the Neighborhood of Great Finborough Hall [Suffolk, England.]. < *Loudon's Mag. Nat. Hist.*, iv, 1831, p. 449.

Nominal list.

1831. SELBY, P. J. A Catalogue of the Birds hitherto met with in the Counties of Northumberland and Durham. < *Trans. Nat. Hist. Soc. Northumb. Durh. and Newc.-u.-Tyne*, i, 1831, pp. 244-290.

Not seen. I find that I have two copies of this title, both at second-hand, and differently worded: one reads as above; the other "... on the coast of ..."; which is right? The list is said to give 214 spp. It was the first list of this locality of any authority, or approaching completeness (*vide* Wallis, Sharp, Hogg); and remained single for over 40 years, until the appearance of Hancock's, in 1874, q. v.

831. "T. G." Late Appearance of the Swift, Swallow, and Marten [in England]. < *Loudon's Mag. Nat. Hist.*, iv, 1831, p. 431.

1831. WATERTON, C. Remarks on Professor Rennie's Edition of Montagu's Ornithological Dictionary. < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 516-520.

1831. WHITE, W. H. The Cuckoo and the Swift (*Cuculus canorus* and *Cypselus Apus*). < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 184, 185.

1831. "X. Y. Z." Birds either resident or occasional Visitors of Renfrew [Scotland] and its Neighborhood, from November to February 1, 1831. < *Loudon's Mag. Nat. Hist.*, iv, 1831, p. 269.

Nominal list of 39 spp.

1831. YARRELL, W. Additions to the Catalogue of British Birds, with Notice of the Occurrence of several rare Species. < *Loudon's Mag. Nat. Hist.*, iv, 1831, pp. 116-118.

Falco rufipes, *Alauda alpestris*, *Anas stelleri*, *Sterna caspia*.

1831. YARRELL, W. [On the occurrence of North American Birds (*Anas sponsa*, *A. occidua*, and *Alauda alpestris*) in England.] < *P. Z. S.*, i, 1831, p. 35.

1832. "A. R. Y." [Review of The British Naturalist.] < *Loudon's Mag. Nat. Hist.*, v, 1832, pp. 49-71.

"Our author's forte evidently lies in ornithology"; and this review is largely occupied with this subject.

1832. BARKER, W. G. Additions to M. P.'s "List of Birds found in the Neighbourhood of Wensleydale, in the North Riding of Yorkshire." < *Loudon's Mag. Nat. Hist.*, v, 1832, pp. 723-725.

1832. BEWICK, T. A | History | of | British Birds. | By Thomas Bewick. | Vol. I [11].
Containing the | History and Description | of | Land [Water] Birds. | New-
castle: | printed by Charles Henry Cook, | for R. E. Bewick: sold by him,
Longman and Co., London; | and all Booksellers. | 1832. 2 vols. 8vo. Vol.
I, Land Birds, pp. i-xl (title, preface, introduction, technical terms and
contents), 1-386, figg. —. Vol. II, Water Birds, pp. i-xxii (title, preface, in-
troduction and contents), 1-424 (pp. 414-424 being devoted to figures of
“Foreign Birds”), figg. —.
Not seen: title from A. Newton, in epist.
This is the *seventh* edition: see the orig. ed., 1797-1804.
1832. BREE, W. T. Remarks on the Spring of 1832, as compared with that of 1831,
together with a Calendar showing the Difference of the Two Seasons [in Eng-
land]. < *London's Mag. Nat. Hist.*, v, 1832, pp. 593-596.
Partly ornithological.
1832. “CORRESPONDENT.” Notice of the Arrival of Twenty-six of the Summer Birds
of Passage in the Neighbourhood of Carlisle, together with some of the scarcer
Species that have been met with in the same Vicinity during the Year 1831;
with Observations, &c. < *Philos. Mag.*, xi, 1832, pp. 82-86.
1832. D[ENSON], J. [Notes on several species of British Birds.] < *London's Mag.*
Nat. Hist., v, 1832, pp. 596, 597.
1832. DOVASTON, J. F. M. Chit-Chat. < *London's Mag. Nat. Hist.*, v, 1832, pp. 497-505.
Imaginary dialogue concerning some British Birds, etc. Continued, *op. cit.*, vi, 1833, pp. 1-11.
1832. DUNCAN, G. The Birds of Renfrew and its Neighbourhood. < *London's Mag.*
Nat. Hist., v, 1832, pp. 571-573.
Annotated list.
1832. ELIS, D. Beytragen von Schwalben u. Repphühnern. < *Oken's Isis*, Bd. xxv,
1832, p. 696, 697.
Auszug aus d. *Edinb. New Philos. Journ.*, Bd. iv, Heft 8, 1828, p. 290.
1832. EDMONSTON, L. Bemerkungen über Larus parasiticus, L. rissa (Kittiwake) et
Colymbus grylle. < *Oken's Isis*, Bd. xxv, 1832, p. 597, 598.
Auszug aus d. *Edinb. Philos. Journ.*, Bd. vii, 1822, Heft 13, p. 90.
1832. FLEMING, J. Ueber den Einfluss der Menschen auf die Verbreitung der brit-
ischen Thiere. < *Oken's Isis*, Bd. xxv, 1832, p. 606.
Auszug aus d. *Edinb. Philos. Journ.*, xi, 1824, p. 287.
1832. FLEMING, J. Aehrenlese an den schottischen Küsten, in August. < *Oken's Isis*.
Bd. xxv, 1832, p. 662.
Auszug aus d. *Edinb. Philos. Journ.*, Bd. x, 1823, Heft 17, p. 95.
1832. GREENHOW, E. H. Birds of Passage visiting the Parish of Tynemouth, in
Northumberland. < *London's Mag. Nat. Hist.*, v, 1832, pp. 566-569, fig. 102.
1832. GREENHOW, E. H. The Dates of Appearance, Breeding, and Disappearance of
some Birds and Insects, in the Parish of Tynemouth, during the Year 1831.
< *London's Mag. Nat. Hist.*, v, 1832, p. 566.
1832. “J. A. H.” The Forked-tail Petrel (*Procellaria Leachii*), and a species of Tern
found dead inland [in England]. < *London's Mag. Nat. Hist.*, v, 1832, p. 283.
1832. “J. D. M.” List of Rare Birds killed near Belfast [Ireland]. < *London's Mag.*
Nat. Hist., v, 1832, p. 577.
1832. “J. D. M.” Linnaeus, as reflected on in Rennie's “Montagu's Ornithological
Dictionary.” < *London's Mag. Nat. Hist.*, v, 1832, pp. 193-195.
1832. “J. W.” Rarer Birds taken near Worcester. < *London's Mag. Nat. Hist.*, v, 1832,
pp. 379, 380.
1832. “M. P.” Birds and Mammalia found in the Neighbourhood of Wensleydale, in
the North Riding of Yorkshire. < *London's Mag. Nat. Hist.*, v, 1832, p. 723.
With Note by “J. D.”

1832. "M. R." [*i. e.*, M. P.] Birds found in the Neighbourhood of Wensleydale, in the North Riding of Yorkshire. < *London's Mag. Nat. Hist.*, v, 1832, pp. 553-555.
Nominal list.
1832. "RUSTICUS." Something about [British] Birds and Birdnesting. < *London's Mag. Nat. Hist.*, v, 1832, pp. 601-603.
1832. SALMON, J. D. Observations on the Eggs and Birds which were met with in a Three Weeks' Sojourn (from May 30. to June 21. 1831) in the Orkney Islands. < *London's Mag. Nat. Hist.*, v, 1832, pp. 415-425.
Cf. *tom. cit.*, p. 675.
1832. STEWART, J. V. A List of, and Remarks on, some of the Mammalious [*sic*] Animals, and the Birds, met with in the Three Years preceding December 4. 1823, on the Northern Coast of Donegal [Ireland]. < *London's Mag. Nat. Hist.*, v, 1832, pp. 578-586.
Extended and interesting commentary.
1832. "SUBSCRIBER." European Singing-Birds in India. < *London's Mag. Nat. Hist.*, v, 1832, p. 734.
1832. "T. G." The Forked-tail Petrel and Gray Phalarope taken near Chipping Norton, Oxon. < *London's Mag. Nat. Hist.*, v, 1832, pp. 282, 283. With Note by "J. D.", p. 283.
1832. "T. K." Rarer Birds taken in Ireland, principally in the Vicinity of Dublin, in the Winter of 1831-2. < *London's Mag. Nat. Hist.*, v, 1832, pp. 576, 577.
1832. WHITE, G. (*Ed. Jardine.*) The | Natural History | of | Selborne. | By the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | With additions | by | Sir William Jardine, Bart. F. R. S. E. F. L. S. M. W. S. | Author of "Illustrations of Ornithology." — | New Edition. — | Printed for | Whittaker, Treacher, & Co. London; | & Waugh & Innes, Edinburgh. | — | 1832. 1 vol. 12mo (half sheets), eng. title-p., pp. i-xvi, 1-343, many full-page figg., not numbered.
Forming Vol. XLV of *Constable's Miscellany*.
This I have seen. It is apparently the same as the 1829 Jardine ed., which also forms Vol. XLV of the *Miscellany*, reissued with a new title-page (compare that of 1829), and some additional full-page wood-cuts; the collation otherwise identical (pp. i-xvi, 1-343).—Examine the two 1829 titles which I give above.
1833. ANON. History of british Birds. The figures engraved on wood by Bewick, New-Castle. Vol. I. 1797. S. 355. II. 1816. 361. < *Oken's Isis*, Jahrg. 1833, p. 906.
Short notice, titled with abominable inaccuracy, as usual with the *Isis* reviewers.
1833. BLACKWALL, J. On the Instincts of Birds. < *Edinb. New Philos. Journ.*, xiv, 1833, pp. 241-261.
From *Mem. Lit. and Philos. Soc. Manchester*, 2d ser., Vol. V.
1833. BREE, W. T. Remarks on the Spring of 1833. < *London's Mag. Nat. Hist.*, vi, 1833, pp. 488-491.
Notes on various British Birds.
1833. BREE, W. T. Instances of singular Nidification in [British] Birds. < *London's Mag. Nat. Hist.*, vi, 1833, pp. 32-36, figg. 5, 6. With Note by "J. D.", pp. 36, 37.
1833. "CORRESPONDENT." Notice of the Arrival of Twenty-six of the Summer Birds of Passage in the Neighbourhood of Carlisle, during the Spring of 1832, together with some of the scarcer Species that have been obtained in the same Vicinity from the 10th of November 1831, to the 10th of November, 1832; with Observations, &c. < *Lond. and Edinb. Philos. Mag.*, ii, 1833, pp. 96-102.
1833. DOVASTON, J. F. M. Chit-Chat. No. II. < *London's Mag. Nat. Hist.*, vi, 1833, pp. 1-11.
Continued from *op. cit.*, v, 1832, pp. 497-505.

1833. "G. W." Notes on Butterflies, and other Natural Objects; made in Cumberland, through the Month of May, 1832. < *Loudon's Mag. Nat. Hist.*, vi, 1832, pp. 193-202.
Various Birds.
1833. HILL, W. H. Notes on, and a Description of, the Black-headed Gull (*Larus ridibundus*), as the same has been observed near Southminster, on the Coast of Essex; also a List of the Birds seen, in the Course of Twelve Months, in the Neighbourhood of Southminster. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 450-452.
1833. HOY, J. D. The Rose-coloured Ouzel, the Hoopoe, and the Great Bustard, in Suffolk, in 1832. < *Loudon's Mag. Nat. Hist.*, vi, 1833, p. 150.
1833. JOHNSTON, G. Address to the Members of the Berwickshire Naturalists' Club, Sept. 19, 1832. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 11-21.
On British Birds, pp. 12-14.
1833. "RUSTICUS." Something about Sea Birds. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 25-32.
Observed in the Isle of Wight.
1833. "RUSTICUS." Notices on Natural Objects observed in a Ramble on St. Valentine's Day. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 193-198.
Notes on various British Birds.
1833. "RUSTICUS." More about [British] Birds. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 111-116.
1833. SELBY, P. J. Illustrations | of | British Ornithology. | By | Prideaux John Selby, Esq. | Fellow of the Royal Society of Edinburgh; Fellow of the | Linnean Society; and Member of the Wernerian | Natural History Society, &c. | Vol. I [II]. | Land [Water] Birds. | Edinburgh: | Printed for the Proprietor, and Published by | W. H. Lizars, Edinburgh; | Longman, Rees, Orme, Brown, Green and Longman, | London; and W. Curry Jun. & Co. Dublin. | — | MDCCCXXXIII. 2 vols. 8vo. Vol. I, pp. i-xxxviii, 1-450. Vol. II, pp. i-xii, 1-538.
This is the date of completion of the 2 vols. 8vo of text accompanying the elephant folios. At this date, Vol. I, which originally appeared in 1825, was reissued "with additions", and redated. So both vols. bear the same date, 1833. As to Vol. I, this is the date of the 2d edition; as to Vol. II, it is the date of the original edition.
See same author, at 1825; 1825-33; 1821-34; 1834; 1841.
1833. SLANEY, R. A. An | Outline | of the | smaller British Birds, | intended for the use of | ladies and young persons. | — | By Robert Slaney, Esq. M. P. | — | Second Edition. | London: | printed for | Longman, Rees, Orme, Brown, Green, & Longman, | Paternoster-row. | 1833. 1 vol. 16mo. pp. i-viii, 1-168, many cuts.
Date of orig. ed. unknown to me.
"The author, having often derived pleasure from watching the habits of birds, thought that a familiar introduction to this branch of Natural History might prove useful to ladies and young persons, who were not desirous to enter on scientific descriptions, or to encounter works of greater length. With this intention the following pages have been written, comprising extracts from several writers on the subject, together with a few original observations."—(*Preface*.)
1833. "SUBSCRIBER." Notices on a few rarer Birds observed about the Vale of Alford, Aberdeenshire. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 151, 152.
1833. "T. G." Dates of the Appearance of some Spring Birds, in 1832, in the Neighbourhood of Clitheroe, Lancashire. < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 72, 73.
1833. THOMPSON, W. [Remarks on several species of British Birds.] < *Loudon's Mag. Nat. Hist.*, vi, 1833, pp. 447, 448.

1833. WHITE, G. (*Ed. Brown, T.*) The | Natural History | of | Selborne; | Observations on various parts of Nature; | and the Naturalist's Calendar. | By the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | With Notes, | by Captain Thomas Brown, F. L. S. M. K. S. &c. | President of the Royal Physical Society. | [Design.] | Edinburgh: | published, for the proprietors, | by James Chambers, Edinburgh; W. Orr, London; | and W. Curry, jun. & Co. Dublin. | MDCCCXXXIII. 1 vol. 16mo. Adv't., 1 leaf; pp. i-xii, 1-356, several full-page illust., and cuts in text.

Forming the first of the series entitled the "British Library".

This forms Vol. I of the series called the "British Library", and seems to be the first issue of Brown's edition. The "Antiquities" are omitted, and the woodcuts are few in number and of moderate quality.

There are many more editions of the *Capt. Brown* series: see 1834, 1835?, 1840, 1843, 1845.

1833. WHITE, G. (*Ed. Lady Dover.*) The | Natural History | of | Selborne. | By the | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | Arranged for young persons. | London: | printed for N. Hailes, 168, Piccadilly. | 1833. 1 vol. 12mo. pp. i-x, 1-316, figg. —.

Not seen: title and comment from Newton, 1877.

This is now known to have been edited by Lady Dover, and is dedicated to her son, H. A[gar] E[llis], subsequently Lord Clifden. It is the first "Bowdlerized" edition, chiefly remarkable for the omission of several letters (as Nos. 28, 30, 32 and 33 to Barrington) and shorter passages. But the intention was good, and the book has consequently found its way into boys' and girls' hands, who have derived much profit from it. The woodcuts also are pretty.

1833. WHITE, G. (*Ed. Jardine.*) The Natural History and Antiquities of Selborne. London. 1833. 12mo.

Not seen: not cited by Newton, 1877: cited by Ag. and Strickl., *Bibl.*, iv, p. 561, most likely by misprint for 1832, which is the date of one of the Jardine eds., not noted by Ag. and Strickl., unless this "1833" be meant for it. See what is said under the alleged ed. of 1830.

1833. WHITE, G. (*Ed. Rennie.*) The | Natural History and Antiquities | of | Selborne. | By the late | Rev. Gilbert White. | A New Edition, | with Notes, by several eminent Naturalists. | And an enlargement of | the Naturalist's Calendar. | London: | printed for J. and A. Arch [and fifteen other booksellers whose names need not be transcribed]. n. d. (1833). 1 vol. 8vo. pp. i-xii, 1-562, figg. —.

Not seen: title and comment from Newton, 1877.

The names of the contributors of the "Notes" are given on p. xii, and are Herbert ("W. H."), Sweet ("R. S."), and Rennie ("J. R."), whose initials are appended thereto. The title-page bears no year, but on the fly-leaf immediately preceding is "1833". This is the best edition published up to that date, and is commonly known as *Rennie's*. Some of the woodcuts are very well executed.

1834. ANON. Ankunft einiger Wintervögel bey Carlisle. < *Oken's Isis*, Bd. xxvii, 1834, pp. 802, 803.

Anszug aus *Philos. Mag.*, Bd. vi, 1829, pp. 110-114.

1834. BLYTH, E. Notes on the Arrival of the British Summer Birds of Passage in 1834, with incidental Remarks on some of the Species. < *Loudon's Mag. Nat. Hist.*, vii, 1834, pp. 338-348.

1834. CONWAY, C. Sketches of the Natural History of my Neighbourhood [Monmouthshire]. No. 2, Fragments of Ornithology. < *Loudon's Mag. Nat. Hist.*, vii, 1834, pp. 333-338.

Continued with No. 3, in *op. cit.*, viii, 1835, pp. 545-549.

1834. "CORRESPONDENT." Notice of the Arrival of Twenty-six of the Summer Birds of Passage in the Neighbourhood of Carlisle, during the Spring of 1833, together with Notices of some of the scarcer Species that have been obtained in the same Vicinity from the 10th of November 1832, to the 10th of November 1833; with Observations, &c. < *Lond. and Edinb. Philos. Mag.*, iv, 1834, pp. 336-340.

1834. HOY, J. D. A Notice of some rare Species of Birds observed or killed in the County of Suffolk, and adjoining Borders of Essex, during the Winter Months of 1832 and 1833. < *London's Mag. Nat. Hist.*, vii, 1834, pp. 52-56. Note by "J. D.", p. 56.

1834. JESSE, W. Gleanings | in | Natural History. | Second Series. | To which are added | some extracts from the unpublished MSS. of | the late Mr. White, of Selborne. | By Edward Jesse, Esq., | Surveyor of His Majesty's Parks, Palaces, &c. | London: | John Murray, Albemarle Street | MDCCCXXXIV.

Not seen: title and comment from Newton, 1877.

The portion relating to White begins at p. 144, where a fac-simile copy (mentioned beyond under Mr. Harting's edition) of a page of his journal is introduced, and his "Miscellaneous Observations" extend from p. 147 to p. 210. It is not stated how Jesse acquired the original MSS.

1834. "J. G." Remarks on the Natural Productions of Lixden and its Neighbourhood. < *London's Mag. Nat. Hist.*, vii, 1834, pp. 17-19.
Chiefly ornithological.

1834. MARTIN, M. Dates of the Arrival, Breeding, and Departure of the Rock Birds at the Island of St. Kilda, with some other Facts relative to them, as ascertained by M. Martin, Gent., during a Visit to that Island in the Spring of 1697. < *London's Mag. Nat. Hist.*, vii, 1834, pp. 574-576.

This is extracted from Martin's *Voyage to St. Kilda* (orig. ed. 1698, q. v.), to form part of an article by J. D. Salmon, suggesting accumulation of information respecting the British Rock Birds. See 1834, SALMON, J. D.

1834. MORRIS, F. O. A Guide | to an | Arrangement of British Birds; | being | a Catalogue | of all the species hitherto discovered | in Great Britain and Ireland: | and | intended to be used for labelling cabinets or | collections of the same. | By | — | The Reverend Francis Orpen Morris, B. A. | — | of Worcester College, Oxford. | — | London: | published by | Longman, Rees, Orme, Brown, Green, & Longman, | Paternoster-row. | — | Price, 1s. 6d. n. d. [1834.] 1 vol. 8vo. pp. 20, 4 ll.

This is, in fact, a set of labels of British Birds, in large type and with bars, printed only on one side of the page.

1834. MORRIS, B. R. An Attack of a large Sea Gull, in the Manner of a Species of rapacious Bird, upon a Kittiwake Gull. < *London's Mag. Nat. Hist.*, vii, 1834, pp. 512, 513.

The article concludes with a list of some rare birds met with in the neighbourhood of Charmouth, Dorsetshire.

1834. PAGET, C. J., and PAGET, J. Sketch | of the | Natural History | of | Yarmouth | and its neighbourhood, | containing | Catalogues of the Species | of | Animals, Birds, Reptiles, Fish, Insects, and | Plants, at present known. | — | By C. J. and James Paget. | — | Yarmouth: | printed and published by F. Skill, Quay; | sold in London | by Longman, Rees, and Co., Paternoster row; and Simkin | and Marshall, Stationers' Court. | — | 1834. 1 vol. 8vo. pp. i+xxxii, 1-88.

Birds, pp. 3-13: an annotated list of species.

1834. SALMON, J. D. The Accumulation of all possible Information respecting the Habits of the Rock Birds of Britain, by the cooperative Agency of Naturalists residing near Headlands on the Coasts, suggested. < *London's Mag. Nat. Hist.*, vii, 1834, pp. 573, 577.

Includes an article entitled: "Dates of the Arrival, Breeding, and Departure of the Rock Birds at the Island of St. Kilda, with some other Facts relative to them, as ascertained by M. Martin, Gent., during a Visit to that Island, in the Spring of 1697."

1834. THOMPSON, W. [Catalogue of seventeen species of Birds new to the Irish Fauna.] < *P. Z. S.*, ii, 1834, pp. 29-31.

1834. WHITE, G. (*Ed. Jesse.*) [Unpublished MSS.]

See 1834, JESSE, W.

1834. WHITE, G. (*Ed. Brown.*) The | Natural History | ... | A New Edition. | ... | London: | published by Allan Bell & Co. and | Simpkin & Marshall; | Fraser & Co., Edinburgh; | and W. Curry, Jun. & Co., Dublin. 1834.

Not seen: title and comment from Newton, 1877.

This seems to be a (stereotyped?) re-issue of the *Brown* ed. of 1833, *q. v.*, with the unimportant difference of a new title-page. How many more re-issues succeeded I cannot say, but I have evidence of 1835?, 1840, 1843, 1845.

1835. ANON. Ankunft von 26 Zugvögeln bey Carlisle 1832. < *Oken's Isis*, Bd. xxviii, 1835, pp. 569-571.
1835. BLYTH, E. Instances of the Occurrence [in England] of Summer Migrant Birds in the Winter Months:— < *London's Mag. Nat. Hist.*, viii, 1835, p. 512.
Corn Crane, Water Crane, Quail.

1835. CONWAY, C. Sketches of the Natural History of My Neighbourhood. No. 3. Fragments of Ornithology. < *London's Mag. Nat. Hist.*, viii, 1835, pp. 545-549.
Continued from No. 2, *op. cit.*, vii, 1834, pp. 333-238. The locality is Monmouthshire, England.

1835. "CORRESPONDENT." Notice of the Arrival of Twenty-six of the Summer Birds of Passage in the Neighbourhood of Carlisle, during the Spring of 1834, to which are added a few Observations on some of the scarcer Birds that have been obtained in the same Vicinity from the 10th of November 1833 to the 10th of November 1834. < *Lond. and Edinb. Philos. Mag.*, vi, 1835, pp. 424-427.

1835. COTTON, J. The resident | Song Birds | of | Great Britain; | containing | delineations of seventeen birds | of the size of life, | (together with the egg of each species,) | with | a short account of their general habits, and occasional | directions for their treatment in confinement. | By John Cotton, F. Z. S. | — | London: | M. DCCC. XXXV. Part of 1 vol., large 8vo, not paged, 17 coloured plates.

The above is a temporary half-title issued with what is really Part I of a treatise completed the same year, the present publication being intended to form a portion of one giving 33 plates. It comprises 17 plates of the *resident* Song Birds, the other part giving 16 plates of the *summer migrant* Song Birds. See what is said under the other head of this date and author. See also same author at 1836.

1835. COTTON, J. The | Song Birds | of | Great Britain; | containing | delineations, of the natural size, | of thirty-three Birds, | coloured from living specimens, | with | some account of their habits, and occasional directions | for their treatment in confinement. | By John Cotton, F. Z. S. | "Nature's sweet voices, always full of love, | And joyance." Coleridge. | — | London: | M. DCCC. XXXV. 1 vol. large 8vo, not paged, 33 coloured plates.

This is the complete edition of the whole work. The first Part, published 1835 with a half-title-page, contained 17 illustrations and text, of as many of the "Resident Song Birds." On the appearance of the second Part, with 16 illustrations of the "Summer Migrant Birds", in 1835, it was directed that the title of the first Part be canceled, the above title substituted, and the two books merged in one, containing the 33 plates. The two books, nevertheless, are found separately bound, and are citable separately. It will be seen, however, that the above title, issued with Part II, covers *both*, Part II having no title of its own, and Part I having no other than its own title, to be canceled. The general preface, published with Part II, is to precede the preface to Part I in the make-up.

The whole work was reissued in 1836, *q. v.*

1835. GOULD, [J.] [Vogelbälge von den Orkney-Inseln.] < *Oken's Isis*, Bd. xxviii, 1835, p. 454.

P. Z. S., Pt. ii, 1832, p. 189, *seq.*

1835. HILL, W. H. Species of Birds seen in the immediate Neighbourhood of Southminster Vicarage, Essex; additional to those seen there noted in [*op. cit.*] vi, 452. < *London's Mag. Nat. Hist.*, viii, 1835, pp. 573, 574.

1835. JENYNS, L. A | Manual | of | British Vertebrated Animals: | or | Descriptions | of | all the Animals belonging to the classes, | Mammalia, Aves, Reptilia, Amphibia, | and Pisces, | which have been | hitherto observed in the British Islands: | including the | domesticated, naturalized, and extirpated species: |

1835. JENYNS, L.—Continued.

the whole systematically arranged. | By the | Rev. Leonard Jenyns, M. A. | Fellow of the Linnean, Zoological and Entomological Societies | of London; and of the Cambridge Philosophical Society. | Cambridge: | printed at the Pitt Press, by John Smith, | printer to the University. | Sold by J. & J. J. Deighton; and T. Stevenson, Cambridge; | and Longman & Co., London. | — | M. DCCC. XXXV. 1 vol. 8vo. pp. i-xxxii, 1-560.

Class II, Aves, pp. 49-286. This is a considerable work, which was well received and which filled a real want of the time, for a convenient reliable hand-book which should give a fair idea of a classification, and describe species recognizably. It treats of upwards of 300 species, with diagnosis, a few leading references, description and general comment on habits, distribution, &c. Preceding the treatment of the species is a concise characterization of the genera and higher groups; the full genera recognized being 111, with numerous subgenera. The whole matter is very faithfully executed. However moderate a performance it may appear to-day, it was a great boon to the student, who had then mostly to rely upon his Fleming or his Montagu.

I am under the impression that there are some new names—at any rate some new combinations of generic and specific terms—in this Manual.

1835. JENYNS, [L.] Bemerkungen über die Vögel von Cambridgeshire. < Oken's Isis, Bd. xxviii, 1835, pp. 1008-1016.

Uebersetzung: *Trans. Cambridge. Philos. Soc.*, ii, 1827, p. 287.

1835. LORD, W. [30 Vogelbälge von Schotland.] < Oken's Isis, Bd. xxviii, 1835, p. 356.

P. Z. S., 1830, p. 149, seq.

1835. MARSHALL, J. D. Observations on the Zoology of the Island of Rathlin, Off the Northern Coast of Ireland. < *Lond. and Edinb. Philos. Mag.*, vii, 1835, pp. 492, 493.

From *Rep. Brit. Soc. Adv. Sci.*, Dublin, 1835. See same author, 1836.

1835-43. MEYER, H. L. Coloured Illustrations of British Birds and their Eggs. 4 vols. 4to. Pub. in 78 Parts. 1835-43.

This is said to be the date of the original edition, which I have not seen. See what is said under head of the 2d ed., 8vo, 1842-1850.

1835. MORRIS, F. O. [Tippet Grebe, Peregrine Falcon, and Hoopoe, in Britain.] < *Loudon's Mag. Nat. Hist.*, viii, 1835, pp. 510, 511.

1835. "S. D. W." Notices of Birds in Plumage of an unusual Colour. < *Loudon's Mag. Nat. Hist.*, viii, 1835, pp. 110-112.

The instances are chiefly of British Birds. The article continues to p. 113, with notices of additional instances by J. D. Salmon.

1835. SELBY, P. J. Notice of Birds observed in Sutherlandshire, June 1834. < *Rep. Brit. Assoc. Adv. Sci.* for 1834, 1835, pp. 610-613.

Annotated list of 85 spp.

1835. THOMPSON, W. [On two rare Irish Birds (*Scolopax Sabini* and *Larus Sabini*).] < *P. Z. S.*, iii, 1835, pp. 82, 83.

1835. THOMPSON, W. Notices of some Additions to the British Fauna. < *P. Z. S.*, iii, 1835, pp. 77-82.

Of birds, 9 spp.

1835. THOM[P]SON, [W.] Ueber neue Vögel in Irland. < (*Oken's Isis*, Bd. xxviii, 1835, p. 1026.

Proc. Zool. Soc. Lond., Part ii, 1834.

1835† WHITE, G. (*Ed. Brown.*) The Natural History of Selborne. . . .

There is said to be a Brown ed. of this date by Engelmann, *Bibl.* p. 292. See the orig. Brown ed., 1833.

1836. ANON. A | Catalogue | of the | Ashmolean Museum, | descriptive of | the Zoological Specimens, | Antiquities, Coins, | and | Miscellaneous Curiosities. | [Cut.] | Oxford, | printed by S. Collingwood. | MDCCLXXXVI. 1 vol.

1836 ANON.—Continued.

large 8vo. 2 p. 11. (title, contents), pp. i-viii (history of the museum), 1-188, frontisp. and 1 other plate.

Systematic list of Birds, pp. 15-66. List of specimens of heads and beaks of Birds, pp. 72-77. Here occurs, p. 74, No. 81, "Head and Leg of the Dodo;" to which circumstance the whole work owes its special value now.

1836. ANON. A Catalogue of the Collection of British Quadrupeds and Birds, in the Museum of the Cambridge Philosophical Society. Cambridge. 1836. 12mo.
Not seen.

1836. BLYTH, E. On the Species of Birds observed, during the last Four Years, in the Vicinity of Tooting, Surrey; with a few Remarks on their comparative Numbers and Distribution. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 622-638.

1836. BLYTH, E. [On the Occurrence of the Carrion Crow and Nightingale in Ireland.] < *London's Mag. Nat. Hist.*, ix, 1836, pp. 546-548.

1836. "C. J." Some Remarks on Mr. N. Wood's British Song Birds. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 515-519.

1836. "CORRESPONDENT." Notice of the Arrival of Twenty-six Species of the Summer Birds of Passage in the Neighbourhood of Carlisle, Cumberland, during the Spring of 1835; to which are added a few Observations on some of the scarcer Species of Birds that have been obtained in the same Vicinity from Nov. 10. 1834, to Nov. 10. 1835; and a few Meteorological Remarks on the Spring, Summer, and Autumn of 1835, at Carlisle. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 185-187.

Many titles like this one, covering articles of similar character, and all signed "Correspondent", are given in the present Bibliography. They are, I believe, by J. D. Salmon, who long preserved this pseudonym, as Edward Newman did that of "Rasticus".

1836. COTTON, J. The | Song Birds | of | Great Britain; | containing | delineations of thirty-three Birds, | of the natural size, | (including the genus *Sylvia* of Latham.) | coloured principally from living specimens, | with | some account of their habits, and occasional directions | for their treatment in confinement. | By John Cotton, F. Z. S. | "Nature's sweet voices, always full of love | And joyance." Coleridge. | — | London: M.DCCC.XXXVI. | 1 vol. 8vo, not paged, 33 coloured pl., not numbered.

This is a reissue, or 2d. ed.; orig. ed. 1835, 1835 *bis*, which see.

The volume treats very pleasantly of the subject, and gives a coloured plate of the thirty-three species included by the author among the "song birds" of Great Britain.

1836. DALE, J. C. Egret, Pratincole, Black Woodpecker, Blackchin Grebe [as British Birds]. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 598, 599.

1836. [EDITORIAL.] Remains of birds in the strata of Tilgate Forest, Sussex, England. < *Sillim. Am. Journ. Sci.*, xxix, 1836, p. 362.

1836. EYTON, T. C. A | Catalogue | of | British Birds. | — | By T. C. Eyton, Esq. | London: | Longman, Rees, Orme, Brown, Green, and Longman; | and Houlston and Son, Paternoster-row. | — | M.DCCCXXXVI. 1 vol. 8vo. pp. i-iv, 1-67.

Names, with some little synonymy: arrangement nearly that of Cuvier. The piece also forms a part of the same author's "A History of the Rarer British Birds," 1836, *q. v.*

1836. EYTON, T. C. A History | of the | Rarer British Birds. | By T. C. Eyton, Esq. | [Figure.] | Illustrated with Woodcuts. | London: | Longman, Rees, Orme, Brown, Green, and Longman; | and Houlston and Son, Paternoster-Row. | — | M.DCCCXXXVI. 1 vol. 8vo. pp. i-vi, 1 l., pp. 1-101, many woodcuts.

With which belongs: A | Catalogue | of | British Birds. | — | By T. C. Eyton, esq. | London: | [Same imprint and date.] | pp. i-vi, 1 l., pp. 1-67.

The "History" and "Catalogue" are entirely distinct, being separately titled and paged and also published separately; but together form the volume, the Catalogue being included in the table of contents of the History. The History treats of 43 spp., of each of which a fine woodcut is given, and the work is further copiously illustrated with miscellaneous woodcut

1836. EYTON, T. C.—Continued.

tail-pieces, often very spirited. In the Catalogue, the author endeavors to replace the names of the older writers on Ornithology; the arrangement is nearly that of Cuvier. The first division of the Catalogue is the regular list; the second, the extinct species; the third, the principal introduced one; the fourth, the doubtful ones. The Catalogue is synonymatic to a degree, but not otherwise annotated. The species are not numbered, nor is the total stated.

1836. LINGWOOD, R. M. A List of Species of Birds and Mammiferous and Amphibious Animals, observed in Connamara, in August 1835. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 128, 129.

1836. MACGILLIVRAY, W. Descriptions | of the | Rapacious Birds | of | Great Britain. | By William Macgillivray, A. M. | Conservator of the Museum of the Royal College of Surgeons | of Edinburgh, | Fellow of the Royal Society of Edinburgh, Member of the | Wernerian Natural History Society, of the Academy | of Natural Sciences of Philadelphia, of the Lyceum of New York, &c. | — | Macleachlan & Stewart, Edinburgh: | Baldwin & Cradock; London; and | Hodges & Smith, Dublin. | MDCCCXXXVI. 1 vol. sm. 8vo. (half sheets, 4 ll. to a sig.), pp. i-viii, 1-482, with 2 ll. adpts., pll. i, ii, numerous woodc.

Extended descriptions of 27 spp., with biographical and synonymatic matter, and characters of the genera and families; with a short prefatory essay on the study of natural history from a zealous, ingenuous, and sensitive naturalist, in precarious health, smarting under a real or fancied grievance, and facing a probability of defeated ambition. The pll. are anatomical; the figg. illustrate the heads of various species.

1836. MARSHALL, J. D. Observations on the Zoology of the Island of Rathlin, off the Northern Coast of Ireland. < *Rep. Brit. Assoc. Adv. Sci. for 1835, 1836 (Misc. Comm.)*, pp. 68, 69.

32 land and 28 water birds noticed, with observations on some of the commonest ones.—See same author, 1835.

1836. SALMON, J. D. Notice of the Arrival of Twenty-nine Migratory Birds in the Neighbourhood of Thetford, Norfolk; together with some of the scarcer Species that have been met with in the same Vicinity, during the Years 1834 and 1835, and the Spring of 1836; with Observations, &c. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 520-528.

1836. SELBY, P. J. On the Quadrupeds and Birds inhabiting the County of Sutherland, observed there during an Excursion in the Summer of 1834. < *Edinb. New Philos. Journ.*, xx, 1836, pp. 286-295.

Running commentary on about one hundred species of birds in the 2d instalment of the article; the former (*ibid.*, pp. 156-161) on the mammals.

1836. WHITE, G. (*Ed. Blyth.*) The | Natural History | of | Selborne, | with its | Antiquities; Naturalist's Calendar, &c., | By | the Rev. Gilbert White, A. M. | A New Edition. | with Notes by Edward Blyth. | London: | Published by Orr & Smith, Paternoster Row. | MDCCCXXXVI. 1 vol. 8vo. pp. iv-xx, 418.

Not seen: title and comment from Newton, 1877.

In this is inserted, between the "Advertisement" and the text, an interesting account of Selborne by Mudie, who gathered the particulars on the spot, and some notes on the "Antiquities" are supplied by Dixon. In spite of its very small type and poor woodcuts, this edition, owing to Blyth's excellent notes, is a very valuable one. There is a stereotyped re-issue of 1858.

1836. WHITE, G. (*Ed. Jardine.*) The Natural History and Antiquities of Selborne London. 1833. 18mo. figg.

An issue of the Jardine ed. of this date is cited by Ag. & Strickl. *Bibl.*, iv, p. 561, and alluded to by Newton, 1877.

1836. WILLIAMSON, W. C. [Notes on the appearance of rare Birds in the vicinity of Scarborough.] < *P. Z. S.*, iv, 1836, pp. 76, 77.

1836. WOOD, N. Natural History of British Song Birds. London. Parker. 1836. 12mo.

Not seen.

1836. WOOD, N. Reply to C. J.'s Remarks on Mr. Neville Wood's British Song Birds. < *London's Mag. Nat. Hist.*, ix, 1836, pp. 566-568.
1836. YARRELL, W. [Notice of the Dottrell (*Charadrius morinellus*, Linn.) breeding at Skiddaw, and of the Gray Snipe (*Macrorhamphus griseus*, Leach) having been obtained near Carlisle.] < *P. Z. S.*, iv, 1836, pp. 1, 2.
1837. ANON. A Manual of british Vertebrate animals by L. Jenyns. London, Deighton. 1835. 8. 559. < *Oken's Isis*, Bd. xxx, 1837, pp. 825, 826.
1837. BLYTH, E. On Woodcocks, Fieldfares, and Redwings building within the British Islands. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 439-441.
1837. CLARKE, W. B. Signs of Spring, 1837. < *Charlesw. Mag. Nat. Hist.*, i, 1837, p. 279. Observations on British Birds, etc.
1837. [CORNISH, W. F.] Observations | on the | Habits | of | Exotic Birds; | that is, | those which visit England in the spring | and retire in the autumn, | and those which appear in the autumn | and disappear in the spring. [By the Rev. W. F. Cornish.] — | Exeter: | published by W. Curson, High-street; | and Whittaker and Co. London. | — | 1837. 1 vol. 16mo. cover title, pp. i-iv (title and preface), pp. 1-79.
- This little treatise on British migrants is, we are told, but a fragment of nearly 200 chapters on Natural History which the author had prepared, when he put it out as a feeler; designing to commit the rest of "the labour of Thirteen Years" "ad ficum et piparem" if it should not be well received. I may add that I have seen none of the rest.
1837. DUNN, R. The | Ornithologist's Guide | to | the Islands of | Orkney and Shetland. | By Robert Dunn, | Animal-preserver, | Hull. | — | London: | printed by | Richard Taylor, Red Lion Court, Fleet Street; | and published by the author, | 31, George Street, Hull. | 1837. 1 vol. 8vo. pp. i-x, 1 l., pp. 1-128, frontisp. and 2 maps.
- There is a later ed., London, Van Voorst, 1840.
- It is a good guide: the first half is narrative of the author's experiences; the rest gives a list of the birds met with, with his observations on their breeding and other habits.
1837. FAIRHOLME, G. Observations on Woodcocks and Fieldfares breeding in Scotland. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 336-340.
1837. HOY, J. D. A Notice of the Occurrence of Two Species of the Genus *Tringa*, new to the British Islands; with a List of the rarer Birds killed in Suffolk, and the adjoining Borders of Norfolk and Essex, from the Autumn of 1835 to December, 1835. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 115-118.
1837. KIDD, W., and others. Some account of the Birds of Godalming. < *Entomol. Mag.*, iv, 1837, pp. 263-275.
- Not seen.
- 1837-52. MACGILLIVRAY, W. A | History | of | British Birds, | indigenous and migratory: | including | their organization, habits, and relations; | remarks on classification and nomenclature; | an account of the principal organs of Birds, and | observations relative to practical | ornithology. | Illustrated by | numerous engravings. | By William Macgillivray, A. M., F. R. S. E. | Member of the Wernerian Natural History Society of Edinburgh, of the Natural | History Society of Philadelphia, of the Royal Physical and Cuvierian | Societies, &c.; and Conservator of the Museum of the Royal | College of Surgeons of Edinburgh. | Vol. I [-V]. | [mut. mut.] | London: | printed for Scott, Webster, and Geary, | 36, Charterhouse Square [mut. mut.]. | 1837[-1852]. 5 vols. 8vo. As follows:—
- . . . Vol. I. | Rasores, Scrapers, or Gallinaceous Birds; | Genitores, Coopers, or Pigeons; | Deglubitores, Huskers, or Conirostral Birds; | Vagatores, Wanderers, or Crows and allied Genera. | [Imprint as above.] | 1837. 2 p. ll., pp. i-xvi, 1-631, figg. 1-95, pll. i-ix.
- . . . Vol. II. | Cantatores, Songsters. | [Imprint as above.] | 1839. 2 p. ll., pp. i-xii, 1-503, figg. 96-185, pll. x-xiii.

1837-52. MACGILLIVRAY, W.—Continued.

. . . Vol. III. | Reptatores, Creepers; Scausores, Climbers; Cuculinae; | Raptatores, Plunderers, or Rapacious Birds; | Excursores, Snatchers; Voli-
tatores, Gliders; | Jaculatores, Darters. | [Imprint as above.] | 1840. 1 p. l.,
pp. i-xii, 1-763, figg. 186-276, pll. xiv-xxii.

. . . Vol. IV. | Cursores, or Runners. | Tentatores, or Probers. | Aucupatores,
or Stalkers. | Latitores, or Skulkers. | London: | William S. Orr, and Co.,
Amen Corner, | Paternoster Row. | 1852. pp. i-xxviii, 1-700, figg. 1-59, pll.
xxiii-xxvi (or i-iv).

. . . Vol. V. | Cribratores, or Sifters. | Urinatores, or Divers. | Mersatores,
or Plungers. | [Imprint as last above.] | 1852. pp. i-xx, 1-683, figg. 60-100, pll.
xxvii-xxix (or v-vii).

The last 2 vols. having thus a different imprint from that of the first 3, and being separated therefrom by a considerable interval of time (during which Engelmann's *Bibl.* appeared), the work has sometimes been cited as of only 3 vols. But the 5 vols. are continuous and uniform parts of one "History."

This is Macgillivray's *opus magnum*; not to be confounded with his "Manual" in 2 vols., 1840-42.

Opinion differs greatly respecting the merit of Macgillivray's work, and it is not easy to decide in a case where one's estimate must depend so much upon whether one *likes* the author or not; for this writer's personality colors his work throughout, and almost necessarily impresses itself upon the reader. For instance, Macgillivray is to me personally so agreeable a companion, that I doubt not that my warm appreciation of his ability and acquirements is open to a charge of favoritism. His writings attract me strongly; and possess for me the nameless fascination that thousands have felt in perusing the pages of Gilbert White or of Alexander Wilson. Macgillivray appears to have been of an irritable, highly sensitized temperament, fired with enthusiasm and ambition, yet contending, for some time at least, with poverty, ill-health, and a perhaps not well-founded though not therefore the less acutely-felt sense of neglect; thus ceaselessly nerved to accomplish, yet as continually haunted with the dread of failure. The result of such an unstable equilibrium as this will depend mostly upon circumstances; there is the *æpôtus* within, but the direction it takes will be along the line of least resistance. This author was undoubtedly unwise in his frankness; but diplomacy is a stranger to such characters. The strength of our universal instinct of self-preservation sometimes converts an attitude intended to be simply defensive into one positively offensive; and Macgillivray's way of handling people whom he disliked or despised often savored of arrogance. It may be doubted that there was really any "holier than thou" feeling at heart, whatever his seeming assumption of superior knowledge or greater love of truth in comparison with his peers. If he never hesitated to differ sharply with any one, or to express his own views pointedly—if he scarcely disguised his contempt for triflers, blockheads, pedants, compilers, and theorizers—if he was also fallible, even as the rest of us—he was nevertheless a lover of nature, an original thinker, a hard student, and, finally, an ornithologist of large practical experience, who wrote down what he knew or believed to be true with great regard for accuracy of statement and in a very agreeable manner.

I suppose this elaborate and extended "History" to be one of the most accurate and reliable of the many which handle the same subject; and it is doubtless, to many besides myself, one of the most entertaining. I am competent to judge of the fidelity of Macgillivray's pictures of bird-life only in the instances of birds common to America and Europe; but in such cases they tally well with my own experiences; and when writing descriptions of the form and colors of birds, I find it of no little assistance to have Macgillivray's page before me as well as the specimens themselves. There is no question of this author's accuracy and clearness in describing specimens in hand.

Besides the specific descriptions which form most of the text of this work, there is a good deal of general ornithology in the matters of classification and anatomy—the latter especially relating to the structure of the digestive system, upon which the author's classification is so largely based. For Macgillivray, it will be remembered, discovered or invented for himself a classification of birds, which has at least the merit of being original with him, and of representing conclusions derived from actual observation. He developed his system consistently, and published it with express unconcern for its fate at the hands of others; he liked it, and if others did not, so much the worse for them—did they expect him to furnish brains also? The outline of this system may be seen from the above title. Though based upon anatomical structure, it is, in fact, one of the purest physiological or so-called "teleological" classifications we have had; worked out upon the *adaptive modifications* of certain organs. It thus proceeds upon what appears to an Evolutionist of to-day to be a radically false premise; and its agreement in any points with a scheme based upon purely morphological con-

1837-52. MACGILLIVRAY, W.—Continued.

siderations of the theory of descent must be regarded as rather fortuitous than essential. At the time he wrote, Evolution had no place in taxonomy; to-day, we utterly discard any scheme of classification, however convenient or however specious, that does not proceed upon the understanding that all birds are descended from a common ancestor, and consequently bear to each other simply the relation of parent and offspring; that classification is entirely a matter of our skill or luck in tracing pedigree to construct a genealogical table; and that there is no such entity in nature as a genus or a species was supposed to be when Macgillivray studied birds.

A marked feature of this work is the numerous chapters on "Practical Ornithology", that is to say, on field work in this branch of science. These are given in the form of personal narrative, with gossip incident and imaginary dialogue,—the hint of which seems to have been taken from the similar sketches of scenery and character which Audubon introduced in his "Ornithological Biography". They reflect many reminiscences of the author's intimate personal relations with the "American backwoodsman". These two seem to have been very congenial spirits; and what jolly times they must have had o' nights, after their tramps, in some snuggerly with a bottle between them! . . .

William Macgillivray has one very high claim upon the regard of American ornithologists: he was the source of Audubon's inspiration in all that pertains to the technic of the latter's great work. "Not to put too fine a point upon it," he furnished nearly all the "ornithology" of Audubon's work, as distinguished from the portraits that the Frenchman drew either with pen or with pencil. Audubon was primarily, and chiefly, an animal painter, and he finally acquired no little familiarity with bird-life; but he began to paint without the slightest idea of ornithology, and never attained even mediocrity as a strict scientist. He loved warmth, color, action; he liked to exaggerate and "embroider", and make his pages glow like a humming-bird's throat, or like one of his own marvellous pictures; he had no genius for accuracy, no taste for dull, dry detail, no care for a specimen after he had drawn it. Macgillivray supplied what was necessary to make his work a contribution to science as well as to art. In fact he wrote a good deal of Audubon's book. After Audubon had told us how his heart beat when the woods echoed to the report of his gun, and he picked up a lovely warbler which he had long sought for, but until then in vain—conveying an impression of years of solicitude about something that he probably never thought of till he stumbled on it accidentally—after all this, and the execution of a beautiful plate, Macgillivray would furnish his friend a technical name and description. The anatomical matter of Audubon's work is probably all Macgillivray's; and the final classification and nomenclature are from the same source. It will be remembered that the names and whole arrangement of the birds in Audubon's *Orn. Biogr.*, 1831-39, were changed in the *Synopsis*, 1839, and in the 8vo ed., 1840-44. This was entirely due to Macgillivray's hand in the matter. Macgillivray is accredited with several of the biographies in Audubon's volume; but the full extent of his joint-authorship is not generally known. There seems to have been some mutually satisfactory understanding between the two, which has never been made public. I allow these facts to go on record, not in the least to the disparagement of a brilliant and famous author, but in simple justice to a stronger, sounder, and no less agreeable ornithologist.

1837. MOORE, E. On the Birds of Devonshire. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 113-115.

The present article includes only the *Raptores*, an annotated list of which is given. It is succeeded by four articles of similar character, each with modified caption: see next four titles.

1837. MOORE, E. On the Passerine Birds of Devonshire. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 176-180.

1837. MOORE, E. Climbing and Gallinaceous Birds of Devonshire. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 227-229.

1837. MOORE, E. On the Wading Birds of Devonshire. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 319-323.

1837. MOORE, E. On the Web-footed Birds of Devonshire. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 360-366.

This article ends the series.

1837. SALMON, J. D. New Tringa, shot near Yarmouth. < *Charlesw. Mag. Nat. Hist.*, i, 1837, p. 54.

T. platyrhyncha, new only as to the locality. The article includes some other rarities of the same region.

1837. SELBY, P. J. An account of two rare British Birds (*Falco apivorus* and *Scolopax sabinii*). < *Trans. Nat. Hist. Soc. Northumb. and Durh.*, ii, 1837, pp. 272-276. Not seen.
1837. TEMPLETON, R. Irish Vertebrate Animals: selected from the Papers of the late John Templeton Esq., Cranmore. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 403-413.
Annotated list of the Birds, pp. 404-408.
1837. THOMPSON, W. Birds, new to Ireland [*Strix scops*, *Colymbus arcticus*, *Procellaria puffinus*]. < *P. Z. S.*, v, 1837, pp. 54, 55.
1837. THOMPSON, W. Contributions to the Natural History of Ireland. < *Mag. of Zool. and Bot.*, i, 1837, pp. 459-465.
Part of a paper read before the *Linn. Soc.*, Apr. 15 and June 3, 1834. 3 spp., *Sterna stolidus*, *Larus sabinii*, *Cygnus bewickii*.
1837. THOMPSON, [W.] Vögel und Fische, worunter viele neu für Irland. < *Oken's Isis*, Bd. xxx, 1837, pp. 131-135.
Proc. Zool. Soc. Lond., 1835, p. 77.
1837. WHITE, G. (Ed. Bennett.) The | Natural History | and Antiquities | of | Selborne. | By the | Rev. Gilbert White, M. A. | With | The Naturalist's Calendar; | and Miscellaneous Observations, | extracted from his Papers. | [Cut.] | A New Edition; | with notes, by Edward Turner Bennett, Esq. | F. L. S. etc. Secretary of the Zoological Society; | and others. | — | London: | printed for J. and A. Arch [and fifteen others—not all the same as those named in the 1833 ed.]. n. d. (1837.) 1 vol. 8vo. pp. i-xxiv, 1-640, 46 illust.
"This remains as yet the standard edition of the work. E. T. Bennett died as it was passing through the press, and the Preface bears the initials ("I. J. B.") of his brother, and is dated 1836; but the volume is believed (cf. Thompson, *Birds of Irel.*, i, p. 199, note) to have appeared in 1837. Besides a selection from the notes given in Rennie's edition (cf. *supra*, 1833), others are added by Prof. Bell ("T. B."), Daniell ("G. D."), Prof. Owen ("R. O."), and Yarrell ("W. Y."); the woodcuts, many by Harvey, are good." (Comment from Newton, 1877.)
1837. WILLIAMSON, W. C. [Notes on the appearance of rare Birds in the vicinity of Scarborough.] < *Lond. and Edinb. Philos. Mag.*, x, 1837, pp. 237, 238.
From *P. Z. S.*, Aug. 9, 1836, pp. 76, 77.
1837. "W. L." Notice of the Breeding of Woodcocks in Selkirkshire; with Observations upon the Habits and Manners of the Black and Red Grouse, and Carrion Crow, in Scotland. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 118-122.
1837. WOOD, N. Late Singing of [British] Birds. < *Charlesw. Mag. Nat. Hist.*, i, 1837, pp. 53, 54.
- 1837-43. YARRELL, W. A | History | of | British Birds. | By | William Yarrell, F. L. S. V. P. Z. S. | [Arms and motto—mut. mut.] | Illustrated by 520 wood-engravings. | In Three Volumes.—Vol. I [-III]. | London: | John Van Voorst, Paternoster Row. | [1837 to] M. DCCC. XLIII. 3 vols. 8vo. Vol. I, being Parts i-xi, July, 1837-March, 1839, pp. i-xxxii (title, preface, and index), pp. 1-526 (text), 527, 528 (temporary index); also, pp. 263*, 316*, 416*.—Vol. II, being Parts xii-xxv, May, 1839-July, 1841, 2 p. ll., pp. 1-670, and p. 232*.—Vol. III, being Parts xxvi-xxxvi, Sept., 1841-May, 1843, 2 p. ll., pp. 1-523. Numberless cuts in all the vols. Pub. in 36 bimonthly Parts, of 3 sheets (43 pp.) each; furnishings with last part.
The title, preface, and index were issued with the concluding part, in May, 1843.—Part I, pp. 1-48, or 3 sheets, appeared in July, 1837—the rest at bimonthly intervals: thus, Part II, pp. 49-96, in Sept., 1837, etc.—The last part also included the accounts of several species added to the British Fauna during the progress of the work, printed on single leaves to be inserted in the body of the work, as follows: Savi's Warbler, Vol. I, p. 268*; Dalmatian Regulus, Vol. I, p. 316*; Short-toed Lark, Vol. I, p. 416; American Purple Martin, Vol. II, p. 232*.
There are also two SUPPLEMENTS, of dates 1845 and 1856, *which see*. One of these is the Supplement to the 1st ed., and may be found bound therewith (pp. 54). The other is a "second supplement", or "First supplement to the Second Edition" (pp. x, 72), and may similarly be found bound therewith.

1837-43. YARRELL, W.—Continued.

The following are the editions of this celebrated work:—

1837-43. EDITIO *princeps*, ut *suprà*.

1845. (Supplement to the same. 8vo. London. Van Voorst. pp. 54.)

1845. SECOND edition.

1856. (Supplement to the same. 8vo. London. Van Voorst. pp. x, 72.)

1856. THIRD edition.

1871-188-. FOURTH edition (now in progress).

"Many recent wood-engravers have approached Bewick, but none have yet equalled him. Among the most successful of these the Messrs. Thompson of London must be specially mentioned. Their woodcuts in Yarrell's 'British Birds' are beautiful works of art; in delicacy of execution they often exceed the engravings of Bewick; but the occasional stiffness of attitude in the birds, and a conventional sketchiness in the accompaniments, indicate the professional artist and not the self-taught child of Nature. The beauty of Yarrell's 'British Birds' is much enhanced by improvements in the preparation of paper and ink, and in the mode of taking off the impressions which have been introduced since Bewick's time. It is probable that if the wood-blocks of Bewick, now in the possession of the great engraver's family, were intrusted to one of our first-rate London printers, an edition of Bewick's 'Birds' could be now produced, far superior in execution to any which was issued in the lifetime of the author."—(*Rep. Brit. Assoc.* for 1844, 1845, p. 202.)

1838. COUCH, J. A | Cornish Fauna: | being a compendium | of the Natural History | of | the county, | Intended to form a Companion to the Collection in the Museum of the Royal | Institution of Cornwall. | — | Part I, | containing the | Vertebrate, Crustacean, | and a portion of the | Radiate Animals. | — | By Jonathan Couch, F. L. S., &c. &c. | — | Truro: | Printed for the Royal Institution of Cornwall, | By L. E. Gillet. | — | 1838. 1 vol. 8vo. pp. i-vi, 5-84.

There are three parts of this "Cornish Fauna": Pt. II, 1841, by the same; Part III, 1844, by Richard Q. Couch. Part I, as above, is occupied with Birds at pp. 10-30; being an annotated list of species.

1838. EDITORIAL. [Notice of Macgillivray's History of British Birds, Vol. I. < *Mag. of Zool. and Bot.*, ii, 1838, pp. 267-269.

- 1838-39. EYTON, T. C. An Attempt to ascertain the Fauna of Shropshire and North Wales. < *Ann. of Nat. Hist.*, i, 1838, pp. 285-293; ii, 1839, pp. 52-56.

An annotated list of species.

- 1838-43. JARDINE, W. The | Naturalist's Library. | Edited by | Sir William Jardine, Bart., | F. R. S. E., F. L. S., etc., etc. | Vol. I. [-IV.] | — | Ornithology. | Birds of Great Britain and Ireland.—Part I. [-IV.] | By the Editor. | — | Edinburgh: W. H. Lizars, [etc.] n. d. [1838-1843.] 4 vols. sm. 12mo. Vol. I, 1838, portrait of Sibbald, eng. title, other title, contents, 1 leaf, pp. 17-315; unnumbered woodc., pll. col'd 1-34. Vol. II, portrait of Smellie, eng. and col'd title, other title, contents, 1 leaf, pp. 17-409; cuts, pll. col'd 1-30 (with title-vignette and portrait=32 plates). Vol. III, 1842?, portrait of Rev. Dr. Walker, eng. title, other title, contents, pp. 17-349; cuts, pll. col'd 1-34 (+ portrait and vignette=36, not "34" as said by the editor). Vol. IV, 1843, portrait of Wilson, eng. title, other title, contents, 1 leaf, pp. 17-313; cuts, pll. 1, 2, 2*, 3-30 (with portrait and vignette=33 plates).

Vol. I="IX", Vol. II="XI", Vol. III="XII", Vol. IV="XIV", of the general arrangement of the series; see *Jard. Nat. Libr.*, 1833-1844. The 1st vol. treats of *Raptores*; 2d, *Dentirostres*, *Contirostres*, *Scansores*, *Tenuirostres*, *Fissirostres*; 3d, *Gallinæ* and *Grallæ*; 4th, *Natatores*; with memoirs of the persons whose respective portraits are prefixed.

The pleasure of handling the admirable and most attractive publications of which the Baronet is author or editor, in some moments gives way to a feeling of vexation at the offishness, or amateurishness, which seems to disdain the conventionalities of book-making.

1838. SELBY, P. J. The Fauna of Twizell. < *Mag. of Zool. and Bot.*, ii, 1838, pp. 387-397.

One of a series; chiefly ornithological; general sketch of the avifauna, and nominal list of 112 spp.

1838. SELBY, P. J. Ueber die vierfüssigen Thiere und Vögel in der Grafschaft South-erland in Schottland im Sommer 1834. < *Oken's Isis*, Bd. xxxi, 1838, pp. 68-73.

Aus d. *Edinb. New Philos. Journ.* vol. xx, p. 156-161, 286-295.

1838. SKAIFE, J. Miscellaneous Ornithological Notes [on birds of Lancashire]. < *Charlesw. Mag. Nat. Hist.*, ii, 1838, pp. 331-334.
1838. SKAIFE, J. On the Ornithology of Blackburn and the North of Lancashire. < *Charlesw. Mag. Nat. Hist.*, ii, 1838, pp. 426-433, 524-531.
Annotated list of 119 spp.
1838. THOMPSON, W. Contributions to the Natural History of Ireland. < *Mag. of Zool. and Bot.*, ii, 1838, pp. 42-57, 170-179, 427-440.
These articles treat at length of the Irish *Raptores*, and of some of the *Insectores*.
1838. THOMPSON, W. Contributions to the Natural History of Ireland. < *Annals of Nat. Hist.*, i, 1838, pp. 12-26, 181-195.
These articles are Nos. 5 and 6, being continued from the *Mag. of Zool. and Bot.*, ii, p. 440.
1838. THOMPSON, W. Notes on Irish Birds. < *Annals of Nat. Hist.*, i, 1838, pp. 155-158.
7 spp.
1838. THOMPSON, W. Notes upon the Natural History of a portion of the South West of Scotland. < *Charlesw. Mag. Nat. Hist.*, ii, 1838, pp. 18-21.
Of Birds, treats of *Merops apiaster*, *Larus islandicus*, and *Sula bussana*.
1838. WILLIAMSON, [W.] C. Seltene Vögel bey Scarborough, welches eine Art Halbinsel bildet und mit Wald bedeckt ist. < *Oken's Isis*, Bd. xxxi, 1838, p. 194.
Anszug aus *Proc. Zool. Soc. Lond.*, Aug., 1836, pp. 76, 77.
1839. ARGENT, J. A | Nomenclature | of | British Birds, | being | a systematic Catalogue | of | all the species hitherto discovered | in | Great Britain and Ireland, | intended for | labelling collections | of | British Birds and their Eggs. | — | By James Argent, | 32, Bishopsgate Street, Without. | — | London : | printed for the Proprietor, | by | Lewis and Co., Bunhill Row. | M DCCC XXXIX. 1 vol. 8vo. cover-title, regular title, and 28 columnus, 2 on a leaf, each page backed blank.
Names only, in large type, to be cut up for labelling.
1839. BLYTH, E. Observations on the Wild Fowl in St. James's Park. < *Charlesw. Mag. Nat. Hist.*, ii, 1839, pp. 469-471.
1839. DOUBLEDAY, H. A Nomenclature of British Birds; being a systematic catalogue of all the species hitherto discovered in Great Britain and Ireland, intended for labelling collections of British Birds and their eggs. Third edition. London: John Van Voorst. 1839. 8vo.
Not seen: nor do I know of other editions.
1839. [EDITORIAL.] Geographical Distribution of British Birds. < *Annals of Nat. Hist.*, iv, 1839, pp. 213, 214.
From Fellows's *Journal in Asia Minor*.
1839. MITCHELL, D. W. Capture of rare Birds [in Britain]. < *Charlesw. Mag. Nat. Hist.*, iii, 1839, p. 467.
1839. PAINE, T., JR. A few particulars respecting some Rare Birds which have lately occurred in the Vicinity of Yarmouth. < *Annals of Nat. Hist.*, iii, 1839, pp. 140-142.
1839. THOMPSON, W. Zoological Notes on a few Species obtained from the South West of Scotland. < *Charlesw. Mag. Nat. Hist.*, iii, 1839, pp. 585-587.
Lestris pomarinus the only bird.
1839. THOMPSON, W. Note on the Effects of the Hurricane of January 7, 1839, in Ireland, on some Birds, Fishes, &c. < *Annals of Nat. Hist.*, iii, 1839, pp. 182-185.
1839. THOMPSON, W. Notes on [4 spp. of] Irish Birds. < *Annals of Nat. Hist.*, iv, 1839, pp. 284, 285.
1840. COWARD, C. Notes on [3 spp. of] British Birds. < *Ann. Mag. Nat. Hist.*, vi, 1840, pp. 74, 75.
1840. DENNY, H. Sketch of the Natural History of Leeds and its Vicinity for Twenty Miles. < *Annals of Nat. Hist.*, v, 1840, pp. 382-396.
Annotated list of about 160 spp. of Birds, pp. 387-392.

1840. GUTCH, J. U. G. Hoopoe.—Little Stint [in England]. < *Ann. Mag. Nat. Hist.*, vi, 1841, pp. 236, 237.
1840. LINGWOOD, R. M. A short Outline of a Fauna for Part of Herefordshire. < *Annals of Nat. Hist.*, v, 1840, pp. 184-188.
Annotated list of 76 spp. of Birds, pp. 185-187.
- 1840-42. MACGILLIVRAY, W. A | Manual | of | British Ornithology: | being a short description of the | Birds of Great Britain and Ireland, | including the essential characters of the species, | genera, families, and orders. | By | William Macgillivray, A. M., M. W. S., &c. | Conservator of the museum of the Royal College of | Surgeons of Edinburgh; lecturer on botany in Queen's College, | and in the Scottish Institution; author of a History of British Birds, | Manuals of Geology, Botany, &c. | Part I. The Land Birds [II. The Water Birds]. | London: | printed for Scott, Webster, and Geary, | Charterhouse Square. | — | 1840 [1842]. 2 vols. sm. 8vo. Vol. I, 1840, pp. 1-248, with 6 ll. of advts., and 31 woodc. figs. Vol. II, 1842, pp. 1-272.
Characters of the genera and higher groups, concise descriptions, with synonymy, and biographical items of the species, preceded by tables of the classification adopted and by an essay on structure of birds and general principles of the science. 320 or 323 spp.; 143 resident, 44 in summer, 36 in winter, 23 visitors from the north, 55 from the south and east, 19 from the west. British Birds are grouped in 19 "orders".—*Raptrices*, *Volitatrices*, *Oculine Birds*, *Jaculatrices*, *Excursatrices*, *Vagatrices*, *Cantatrices*, *Deglubitrices*, *Reptatrices*, *Scandrices*, *Gemitrices*, *Radrices*, *Cursitrices*, *Tentatrices*, *Latitrices*, *Aucupatrices*, *Cribratrices*, *Urinatrices*, *Mersatrices*.—An arrangement virtually in close accord with some approved systems based upon morphological considerations.
This appears to be the original edition of the *Manual*; if so, it is very incorrectly cited by Engelm. *Bibl.* p. 411. There is a later ed. of the same. The *Manual* must not be confused with the author's greater work, *History of British Birds*, in 5 large 8vo vols., 1837-52, q. v.
1840. THOMPSON, W. Additions to the Fauna of Ireland. < *Annals of Nat. Hist.*, v, 1840, pp. 6-14.
3 spp. of Birds.
1840. THOMPSON, W. Notes on [5 spp. of] Irish Birds. < *Annals of Nat. Hist.*, v, 1840, pp. 364, 365.
1840. TREVELYAN, W. C. Abundance of Wild Swans in the Highland Lochs does not necessarily indicate a severe Winter in Iceland and Faroe. < *Edinb. New Philos. Journ.*, xxix, 1840, p. 423.
1840. WHITE, G. (*Ed. Brown.*) The Natural History of Selborne. . . . "Eighth Edition." London: John Chidley, 123, Aldersgate Street. MDCCCXL.
Not seen. See the orig. Brown ed. of 1833. It would appear, from this title, that there were eight issues of the Brown ed. between 1833 and 1840; but I have not been able to learn of so many as this, and it may be doubted that such number of editions, in a proper sense, actually appeared. No one appears to have taken full account of the many reappearances of the insignificant Brown version of "Selborne."
1841. BROWN, J. Capture of some Rare Birds on the Cotswold Hills. < *Ann. Mag. Nat. Hist.*, vi, 1841, p. 395.
1841. GOATLEY, T. The Hoopoe.—The Arctic Gull. < *Ann. Mag. Nat. Hist.*, viii, 1841, p. 235.
In England.
1841. GUTCH, J. U. G. [On rare species of Birds taken near Swansea.] < *Ann. Mag. Nat. Hist.*, vi, 1841, p. 396.
1841. MACGILLIVRAY, J. Account of the Island of St. Kilda, chiefly with reference to its Natural History; from Notes made during a Visit in July 1840. < *Edinb. New Philos. Journ.*, xxxii, 1841, pp. 47-70.
An excellent account of the birds, particularly of *Fulmarus glacialis*, occupies much of this paper.
1841. MACGILLIVRAY, J. Notes on the Zoology of the Outer Hebrides. < *Ann. Mag. Nat. Hist.*, viii, 1841, pp. 7-16.
Chiefly ornithological.

1841. MACGILLIVRAY, J. On some Mammalia, Birds and Fishes lately observed in the neighbourhood of Aberdeen. < *Ann. Mag. Nat. Hist.*, viii, 1841, pp. 230, 231.
3 spp. of Birds.

1841. MUDIE, R. The | Feathered Tribes | of the | British Islands, | By | Robert Mudie. | [Vignette.] | Volume the First [Second]. | Third Edition. | London; | Henry G. Bohn, York Street, Covent Garden. | MDCCCXLI. 2 vols. 16mo or sm. 8vo. Vol. I, eng. title, pp. i-xxiv, 1-379; Vol. II, eng. title, pp. 1-391; woodcut. and col'd pl. in both.

Orig. ed. 1834, 2d ed. 1835; I see quoted 4th and 5th eds., latter 1854. In the preface to the original the author states:

"I have formed no system, I have followed no systematist, I have drawn up no nomenclature of shapes or of colours and I have not counted the feathers, or the scales or reticulations on the *tarsi*, of a single bird. . . . My object . . . is simply, to entice my fellow Britons, . . ." etc.

1841. MUMMERY, S. Birds of Kent. < *Ann. Mag. Nat. Hist.*, vii, 1841, p. 159.

Merely a note of capture of a species of Cuckoo.

1841. MUMMERY, S. Birds of Kent. < *Ann. Mag. Nat. Hist.*, vii, 1841, pp. 523, 524.

Notice of occurrence of a few rare species.

1841. MUMMERY, S. Birds of Kent. < *Ann. Mag. Nat. Hist.*, viii, 1841, pp. 317, 318.

Adds a few rare species. See same author, 1842.

1841. SELBY, P. J. Plates | To | Selby's Illustrations | of | British Ornithology. | [Land Birds. | Vol. I.] | Water Birds. | Vol. II. | [Fig.] | Designed & Engraved by W. H. Lizars. | London. | Henry G. Bohn, York Street Covent Garden. | MDCCCXLI. 2 vols. folio.—Vol. I. Engr. title page, and pll. i, i*, ii, iii, iii*, iv-xii, xii (*bis*), xiii, xiii*, xiv, xv, xv*, xvi, xvii, xvii*, xviii, xviii*, xix-xxvi, xxvi*, xxvii, xxvii*, xxviii-xxxi, xxxiii, xxxiii (*bis*), xxxiv, xxxiv*, xxxv, xxxv, xxxvi (*bis*), xxxvii-xlii, xlii*, xliii, xliii*, xliv, xlv, xlv*, xlv*, xlv*, xlv-lviii, lviii*, lviii* (*bis*), liv-lvi, lvi*, lvii, lviii, lviii*, lix-lxiv, lxiv*, lxv, A, B, C, D. (Pl. i-iv are uncolored details).—Vol. II. Engr. title page and pll. i-iii, v, vi, vi*, vii, vii*, vii*, viii, x, xi, xi*, xii-xvii, xix, xx-xxvii, xxvii*, xxviii, xxviii (*bis*), xxix, xxx, xxx*, xxxi, xxxii, 33, xxxiii*, xxxiii*, xxxiv-xxxix, xxxix*, xl-xliii, xlv, xlv (*bis*), xlv, xlvii, xlvii*, xlviii, xlviii*, xlviii*, xlix, xlix*, l, l (*bis*), li-lv, lv (*bis*), lvii, lvii (*bis*), lviii, lviii*, lviii*, lix, lxi-lxiii, lxv, lxvi, lxvi*, lxvi*, lxvii-lxx, lxx*, lxxi-lxxiv, lxxiv (*bis*), lxxv-lxxviii, lxxviii (*bis*), lxxix-lxxxiii, lxxxiii (*bis*), lxxxiv, lxxxvi, lxxxvii, lxxxvii*, lxxxviii-xcii, xcii (*bis*), xciii, xciv, xciv*, xcv, xcvi, xcvi*, xcvi-c, ci (*bis*), ei*, cii, cii (*bis*), cii*, ciii.

These illustrations originally appeared in 19 parts, in two series, 1821-1834: First series, Land Birds, 8 parts; second series, Water Birds, 11 parts. They came out at intervals of about six months, during the years specified. In 1834, on their completion, they were made up in 2 vols., and furnished with permanent title-page, differing entirely from the above, which is a new title furnished with Bohn's reissue of this date. See 1821-24, 1825, 1825-33, 1833-4, and 1834, SELBY, P. J.

The series ostensibly consists of $65 + 4 + 103 = 172$ plates; but, by actual count, in the copy examined, there are 21 interpolated plates in vol. i, and 34 interpolated plates in vol. ii; making $172 + 55 = 227$; but there are 8 plates missing from the numeration in vol. ii, and 1 from that of vol. i, leaving 218 as the actual number. I find the work cited as of "228" plates, of 382 figures.

1841. THOMPSON, W. Report on the Fauna of Ireland: Div. Vertebrata. < *Rep. Brit. Assoc. Adv. Sci.* for 1840, 1841, pp. 353-409.

Part III, Aves, pp. 364-382, in fact including all British as well as Irish Birds. A List, with careful running commentary on distribution, &c., with notices of "desiderata" in Irish birds among those of Great Britain.

1841. THOMPSON, W. Additions to the Fauna of Ireland. < *Ann. Mag. Nat. Hist.*, vii, 1841, pp. 477-482.

3 spp.—*Falco groenlandicus*, *Pyrrhula enucleator?* *Coracias garrula?*

- 1841-43. THOMPSON, W. The Birds of Ireland. . . . < *Ann. Mag. Nat. Hist.*, viii, 1841, pp. 273-258; viii, 1842, pp. 353-360, 406-430, 486-502; ix, 1842, pp. 141-145,

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April 13, 1880.

1841-43. THOMPSON, W.—Continued.

221-230, 373-381: x, 1842, pp. 50-59, 171-179; xi, 1843, pp. 283-290; xii, 1843, pp. 31-38, 254-258.

This is an interesting and valuable series of articles on Irish ornithology, each having, after the running part of the title here given, a modified caption which I omit in order to bring the series together. It is in some sense a prodrome of the author's standard treatise which appeared later. Thompson was very active in these matters for some years, as his numerous contributions to various periodicals testify.

1841. WHITE, G. (*Ed. Lady Dover.*) The | Natural History of Selborne. | By | The Rev. Gilbert White, A. M., | Fellow of Oriel College, Oxford. | [Cut.] | New-York: | Harper and Brothers, Cliff-street. | — | 1841. 1 vol. 1^{mo}. Title-p.; pp. vii-x (account of White, and index): 1 l. list of engr.: pp. 13-335; with 52 woodcuts.

This is the original issue of the Harpers' American reprint of the *Lady Dover* edition, being No. 147 of the *Family Library*. By the courtesy of the publishers themselves I am informed of the successive issues, as follows:—1842 (two), 1847, 1853, 1855, 1859, 1868.

It is a reprint of the 'Bowdlerized' edition (London, 1833), "arranged for young persons", for which we are indebted to the mother (Lady Dover) of H. A[gar], E[llis]. White said little not *virginibus puerisque*, but was castrated nevertheless. It is a curious thing about this ed. that all the woodcuts in the first part (to Pennant) are reversed, while those in the second part (to Barrington) are not. A new woodcut is introduced at p. 223, instead of the original of the Mistletoe Thrush.

1841. WILSON, J. Additional Notice regarding St. Kilda. < *Edinb. New Philos. Journ.*, xxxii, 1841, pp. 178-180.

Only ornithological in reference to *Coracias garrula*.

1842. DALE, J. C. Fauna of Dorsetshire. < *Ann. Mag. Nat. Hist.*, viii, 1842, pp. 472, 473.

Notices briefly some of the rarer Birds.

1842. FLEMING, J. History | of | British Animals, | exhibiting the descriptive characters and systematical | Arrangement | of | the genera and species of Quadrupeds, Birds, | Reptiles, Fishes, Mollusca, and Radiata | of the United Kingdom; | including | the indigenous, extirpated, and extinct | kinds, together with periodical | and occasional visitors. | — | By John Fleming, D. D. F. R. S. E. M. W. S. &c. | Minister of Flisk, Fifeshire; | and author of the "Philosophy of Zoology." | — | Second Edition. | — | London: | Duncan and Malcolm, Paternoster Row, | MDCCCXLII. 1 vol. 8vo. pp. i-xxiv, 1-566, 1 l.

Orig. ed. much earlier (Preface dated 27 Dec., 1827).

Birds, pp. 41-146; a systematic synopsis (by no means a "history") of 237 spp., treated with brief diagnosis, a little synonymy, and fair descriptions, some of which include remarks on habits, &c., interspersed with analyses of higher groups.

The author's classification is—Order I. *Fissipedes* (Land Birds). Tribe I. *Terrestres*: Sect. I. *Ambulatores*, with 4 groups, *Gallinadæ*, *Columbadæ*, *Accipitres*, *Passeres*: Sect. II. *Scansores*. Tribe II. *Grallæ*. Order II. *Palmipedes* (Water Birds).

1842. GURNEY, J. H. Norfolk Birds. < *Ann. Mag. Nat. Hist.*, ix, 1842, p. 79.

4 spp.

1842. GURNEY, J. H. Norfolk Birds. < *Ann. Mag. Nat. Hist.*, ix, 1842, p. 333.

4 spp.

1842. MUMMERY, S. Birds of Kent. < *Ann. Mag. Nat. Hist.*, x, 1842, pp. 238, 239.

Notices of a few species. See same author, 1841.

1842-50. MEYER, H. L. Coloured | Illustrations | of | British Birds, | and their | Eggs: | By H. L. Meyer, | Vol. I [-VII]. | Containing sixty [60, 60, 60, 60, 60, 72,] plates. | [Vignette.] | London: | G. W. Nickisson, 215, Regent Street, | Successor to the late James Fraser [Simpkin, Marshall, & Co.]. | 1842 [-1850]. 7 vols. 8vo. Vol. I, 1842, pp. i-iv, 1-230, pll. 60; Vol. II, 1844, pp. i-iv, 1-233, pll. 60; Vol. III, 1846 (imprint changes), pp. i-iv, 1-240, pll. 60; Vol. IV, 1847, pp. i-iv, 1-215, pll. 60; Vol. V, 1848, pp. i-iv, 1-192, pll. 60; Vol. VI, 1849, pp. i-iv, 1-185, pll. 60; Vol. VII, 1850, pp. i-iv, 1-206, pll. 72.—In all, 432 plates, mostly coloured. Pub. in parts.

This is a reissue of the original 4to ed., pub. in 78 numbers of (about?) 4 pll. col'd each, 1835

1842-50. MEYER, H. L.—Continued.

to 1843. The present 8vo edition was also published in parts, 1842-50, but the number and dates of them are unknown to me. It is said to resemble the orig. 4to ed. in all respects except in size. I see cited an 8vo ed. as of "1852"; is it anything more than other copies of the present?

Of the plates of Birds, there were published in Vol. I, pll. 1-45; Vol. II, pll. 46-90; Vol. III, pll. 91-135; Vol. IV, pll. 136-180; Vol. V, pll. 181-225; Vol. VI, pll. 226-270; Vol. VII, pll. 271-322. The rest of the plates, 110 in number, making up the 432, are of eggs. I don't know in what order they appeared, but suppose one or more of them with each part of the work.

1842. WHITE, G. *Natural History of Selborne, &c.* New York: Harper Brothers. 1842. 1 vol. 18mo.

There were two issues of the Harper edition of this date. The Harper Brothers originally issued the work in 1841; reissued it in 1842 twice, in 1847, 1853, 1855, 1859, 1868.

1843. ANDREWS, T. *Directions for keeping British Cage Birds*, . . . London. Limbird. 1843. 12mo. pp. 36.

Not seen.

1843. ANON. Note on [British] Birds in March. < *Zoologist*, i, 1842, p. 81.

From Van Voorst's *Naturalists' Almanack* for 1843.

1843. ANON. Note on [British] Birds in April. < *Zoologist*, i, 1843, p. 104.

From Van Voorst's *Naturalists' Almanack*.

1843. ATKINSON, J. Note on dates of migration at Kelvedon, Essex. < *Zoologist*, i, 1843, p. 355.

1843. BANISTER, J. D. Note on the occurrence of rare British Birds near Garstang, Lancashire. < *Zoologist*, i, 1843, p. 145.

Phalaropus lobatus, *Tringa maritima*, *Anas clangula*, *A. histrionica*.

1843. BOND, F. Note on the occurrence of Rare British Birds [6 spp. near Kingsbury]. < *Zoologist*, i, 1843, p. 148.

1843. BOND, F. Note on Water-birds occurring at Kingsbury reservoir. < *Zoologist*, i, 1843, pp. 102, 103.

56 species.

1843. BOND, F. Note on Birds shot at Southend. < *Zoologist*, i, 1843, pp. 39, 40.

30 species.

1843. BRIGGS, J. J. Notes on the capture and appearance of some of our rarer British Birds, in the County of Derby. < *Zoologist*, i, 1843, pp. 178-180, 311-313; ii, 1844, pp. 553-556, 644-646.

1843. DENNY, H. Occurrence of Rare British Birds. < *Ann. Mag. Nat. Hist.*, xii, 1843, p. 297.

Sterna anglica and *Coracias garrula*.

1843. DOUBLEDAY, H. Note on the arrival of the Summer Birds of Passage at Epping, in 1843. < *Zoologist*, i, 1843, pp. 222, 223.

1843. DOUBLEDAY, H. Ornithological Notices [of several Birds of Epping]. < *Zoologist*, i, 1843, p. 13.

1843. DOUBLEDAY, H. Arrival of the Summer Birds of Passage at Epping, from the year 1831 to 1842. < *Zoologist*, i, 1843, p. 12.

1843. DUNCAN, R. D. Notes on the Nests of [some British] Birds. < *Zoologist*, i, 1843, pp. 380-384.

1843. DUNCAN, R. D. Notes on various [eleven British] Birds. < *Zoologist*, i, 1843, pp. 238-242.

1843. FISHER, W. R. Notes on the occurrence of [15 spp. of] rare Birds near Great Yarmouth. < *Zoologist*, i, 1843, pp. 180-183, fig.

1843. FISHER, W. R. Note on the times of arrival of some of the Summer Birds of Passage at Yarmouth, in 1843. < *Zoologist*, i, 1843, p. 248.

1843. FISHER, W. R. Note on the times of departure of some of the Winter Birds of Passage from Yarmouth, in 1843. < *Zoologist*, i, 1843, pp. 248, 249.

1843. GOUGH, T. Note on the effect of the late mild winter on the occurrence of Birds near Kendal. < *Zoologist*, i, 1843, pp. 183-185.

1843. HARLEY, J. Note on the arrival of Summer Birds near Leicester. < *Zoologist*, i, 1843, pp. 220, 221.
1843. HEPBURN, A. Note on the Arrival of a few summer Birds of Passage in the interior of E. Lothian, during the years 1841-2. < *Zoologist*, i, 1843, pp. 219, 220.
1843. HEPBURN, A. Notes on the habits of certain [4 spp. British] Birds. < *Zoologist*, i, 1843, pp. 185-188.
1843. HEPBURN, A. Note on the Migration of Birds [in Britain]. < *Zoologist*, i, 1843, pp. 147, 148.
1843. HEPPENSTALL, J. Appearance of Migratory Birds near Sheffield. < *Zoologist*, i, 1843, pp. 13, 14.
1843. HEPPENSTALL, J. Note on the arrival of the [i. e., 14 species] Summer Birds of Passage near Sheffield, in 1843. < *Zoologist*, i, 1843, p. 247.
1843. HEWETT, W. Note on Magpies and Starlings. < *Zoologist*, i, 1843, p. 351.
1843. HEWITSON, W. C. Note on the Migration of Birds [in Great Britain]. < *Zoologist*, i, 1843, p. 103.
1843. "K." Notice of White's Selborne [ed. of 1843]. < *Zoologist*, i, 1843, pp. 223, 224.
1843. JERDON, A. Note on the arrival of some of the Summer Birds at Boujedward, near Jedburgh. < *Zoologist*, i, 1843, p. 220.
1843. KNOX, A. E. Notes on the Birds of Sussex. < *Zoologist*, i, 1843, pp. 137-140, 225-230; ii, 1844, 430-433.
1843. RODD, E. H. Notes on the occurrence of some of the rarer British Birds in the County of Cornwall. < *Zoologist*, i, 1843, pp. 140-143.
Tringa pectoralis, *Lanius rutilus*, *Loxia leucoptera*, etc.
1843. SALMON, J. D. Note on the early incubation of Birds [in Britain]. < *Zoologist*, i, 1843, p. 76.
1843. WHITE, G. (*Ed. Brown.*) The Natural History of Selborne. "Edinburgh: Printed by Andrew Shortrede, Thistle Lane." 1843.
Not seen. See the orig. Brown ed., 1833.
1843. WHITE, G. (*Ed. Jenyns.*) The | Natural History | of | Selborne. | By | the late Rev. Gilbert White, M. A. | A new edition, with notes by | the Rev. Leonard Jenyns, M. A., F. L. S., | etc. | London: | John Van Voorst, Paternoster Row. | M.DCCC.XLIII. 1 vol. 16mo. pp. i-xvi, 1-398.
Not seen: title and comment from Newton, 1877.
This is beautifully printed and illustrated (as are nearly all the works issued by the same publisher); and the notes of the editor (*hodie* Bloomfield), though not equal to Blyth's for the original matter they contain, are scholarly and to the point. The "Antiquities" are not included.
1843. WILLOUGHBY, S. Note on the occurrence of [24 species of] rare Birds in Lincolnshire. < *Zoologist*, i, 1843, p. 247.
1843. YARRELL, W. Note on the occurrence of [6 spp. of] Birds lately ascertained to be British. < *Zoologist*, i, 1843, pp. 79, 80.
1844. ATKINSON, J. C. Additional Notes on the Moorhen and Dabchick. < *Zoologist*, ii, 1844, p. 767.
1844. ATKINSON, J. C., FISHER, W. R., and NEWMAN, E. Nomenclature of British Birds. < *Zoologist*, ii, 1844, pp. 552, 553.
Letters to and from the editor.
1844. AUSTIN, T. Remarks on the habits of Birds which are natives of the British Islands. < *Ann. Nat. Hist.*, xiii, 1844, pp. 92-94.
1844. AUSTIN, T. Remarks on the Habits of Birds which are Natives of the British Islands. < *Ann. Mag. Nat. Hist.*, xiii, 1844, pp. 92-94.
4 spp. *Corvus frugilegus*, *Falco tinnunculus*, *Rallus crex*, and *Procelluria pelagica*.
1844. BANISTER, J. D. Note on the arrival of some of the Summer Birds of Passage at Pilling, in 1844. < *Zoologist*, ii, 1844, p. 720.

1844. BANISTER, J. D. Note on Instinct in wild Web-footed Birds. < *Zoologist*, ii, 1844, p. 57c.
1844. BARCLAY, H. Note on the arrival of Summer Birds at Layton, Essex, in 1844. < *Zoologist*, ii, 1844, p. 651.
1844. BARTLETT, J. P. Notes on the Ornithology of Kent. < *Zoologist*, ii, 1844, pp. 617-628.
Annotated list of species.
1844. BARTLETT, J. P. Corrections to Mr. Bartlett's Paper on the Birds of Kent. < *Zoologist*, ii, 1844, pp. 718, 719.
1844. BARTLETT, J. P. Note on the Arrival of Summer Birds in the Vicinity of Barham Downs. < *Zoologist*, ii, 1844, pp. 719, 720.
1844. BELL, R. J. Note on the occurrence of the Red-throated Diver and Red-necked Grebe near Derby. < *Zoologist*, ii, 1844, pp. 576, 577.
1844. BELL, R. J. Note on the arrival of Summer Birds near Derby, in 1844. < *Zoologist*, ii, 1844, p. 652.
1844. BLACKWALL, J. Periodical Birds observed in the years 1842 and 1843 near Llanrwst, Denbighshire, North Wales. < *Rep. Brit. Assoc. Adv. Sci. for 1843*, 1844 (*Misc. Comm.*), p. 69.
Times of arrival and departure of 26 spp.
1844. BOND, F. Note on the arrival of Summer Birds at Kingsbury, Middlesex, in 1844. < *Zoologist*, ii, 1844, pp. 650, 651.
25 species.
1844. BOOTH, M. Note on the occurrence of the Osprey and other Birds in the neighbourhood of the river Swale, Yorkshire. < *Zoologist*, ii, 1844, pp. 443, 444.
1844. BRIGGS, J. J. Notes on the departure of [19 spp. of] Summer Birds in the County of Derby, in 1843. < *Zoologist*, ii, 1844, pp. 440, 441.
1844. BRIGGS, J. J. Note on the Songs of [some British] Birds. < *Zoologist*, ii, 1844, pp. 442, 443.
1844. BRIGGS, J. J. Notes on the arrival of our Summer Birds of Passage at Melbourne, Co. Derby, in the Spring of 1844. < *Zoologist*, ii, 1844, pp. 652, 653.
1844. BURY, C. A. [Field] Notes on the Birds of the Isle of Wight. < *Zoologist*, ii, 1844, pp. 516-524, 634-644; iii, 1845, pp. 915-933, 970, 978.
1844. BURY, C. A. Note on the arrival of Summer Birds at Bouchurch, Isle of Wight, in 1844. < *Zoologist*, ii, 1844, pp. 649, 650.
1844. DOUBLEDAY, H. Note on the arrival of Summer Birds at Epping, in 1844. < *Zoologist*, ii, 1844, p. 651.
1844. DRAYTON, —. On the Birds of Lincolnshire and the Fens. < *Ann. Mag. Nat. Hist.*, xiv, 1844, pp. 228-231.
Poem, in Drayton's *Poly-dibion*, S. xxiii, xxv, with scientific notes by W. Yarrell.
1844. DUNCAN, R. D. Notes on [some British] Birds and Birds' Nests. < *Zoologist*, ii, 1844, pp. 647, 648.
vs. Waterton.
1844. DUNCAN, R. D. Rhymes relating to [British] Birds. < *Zoologist*, ii, 1844, pp. 556-560.
1844. [EDITORIAL.] Proceedings of the British Association for the advancement of Science. York, September 25, 1844. From the "Athenæum" of September 23. < *Zoologist*, ii, 1844, pp. 792, 793.
Contains notices of and remarks on John Blackwall's paper "On the Periodical Birds observed in the years 1843 and 1844, near Llanrwst, Denbighshire, North Wales;" on Mr. J. Hogg's "A Catalogue of the Birds observed in South-East Durham and North-West Cleveland;" observations by the President on the Willow-wrens; an abstract of a paper by T. Allis "On the Flight of Birds," and some observations by Messrs. A. and H. E. Strickland and R. Ball on the flight of the guillemot

1844. EDMONSTON, T., JR. Additions to the Birds of Shetland, (Zool. 459) [*Fringilla montifringilla*, *Squatarola cinerea*]. < *Zoologist*, ii, 1844, pp. 551, 552.
1844. EDMONSTON, T., JR. A Fauna of Shetland. < *Zoologist*, ii, 1844, pp. 459-467.
Annotated list of 139 species, resident, migratory, and straggling. About 59 spp. breeding.
1844. FISHER, W. R. Notes on the arrival of some [17 spp.] of the Winter Birds of Passage at Yarmouth in 1843. < *Zoologist*, ii, 1844, pp. 441, 442.
1844. FISHER, W. R. Note of the departure of some of the Winter Birds of Passage from Yarmouth, in 1844. < *Zoologist*, ii, 1844, p. 654.
1844. FISHER, W. R. Note of the breeding of some resident and migratory Birds at Yarmouth, in 1844. < *Zoologist*, ii, 1844, p. 654.
1844. GARNER, R. The | Natural History | of the | County of Stafford; | comprising its | Geology, Zoology, Botany, and | Meteorology: | also its | Antiquities, Topography, Manufactures. | etc. | By Robert Garner, F. L. S. | "Qui docet discit." | London: | John Van Voorst, Paternoster Row. | — | M. DCCC. XLIV. 1 vol. 8vo. pp. i-viii, 1-551, 1-7, many plates, map.
Birds: pp. 254-292; a considerable annotated list of species, introduced by general remarks on the subject. See also p. 550.
1844. GORDON, G. Additions to "A Fauna of Moray." < *Zoologist*, ii, 1844, p. 551.
1844. GORDON, G. Note of the arrival of Summer Birds at Elgin, N. B., in 1844. < *Zoologist*, ii, 1844, pp. 653, 654.
1844. GORDON, G. A Fauna of Moray. II. Birds. < *Zoologist*, ii, 1844, pp. 502-515.
Annotated list of the species.
1844. HARLEY, J. Note on the arrival of Summer Birds at Leicester, in 1844. < *Zoologist*, ii, 1844, p. 652.
1844. HARVEY, Dr. [Abstract of a Catalogue of Vertebrata of county of Cork, Ireland.] < *Rep. Brit. Assoc. Adv. Sci. for 1843, 1844 (Misc. Comm.)*, p. 68.
Aves, 312 British, 253 Irish spp., of which 161 had been observed in Cork.
1844. HEATHCOTE, W. P. Note on Birds of Prey [7 species] found in the parish of Hursley, near Winchester. < *Zoologist*, ii, 1844, pp. 490.
1844. HEPPEXSTALL, J. Note on the arrival of Summer Birds near Sheffield, June 28, 1844. < *Zoologist*, ii, 1844, p. 653.
1844. HUTCHINSON, M. Note of the arrival of the Summer Birds of Passage at Shooter's Hill, Kent, in the Spring of 1844. < *Zoologist*, ii, 1844, pp. 720-722.
1844. MACGILLIVRAY, J. Ueber die Naturgeschichte der Insel Kilda. < *Oken's Isis*, Bd. xxxvii, 1844, pp. 894-896.
Edinb. New Philos. Journ., Bd. xxxii, 1841, p. 47.
1844. MUMMERY, S. Kentish Birds. < *Ann. Mag. Nat. Hist.*, xiii, 1844, pp. 76, 77.
Notes on a few of the rarer species.
1844. MUMMERY, S. Kentish Birds. < *Ann. Mag. Nat. Hist.*, xiii, 1844, pp. 237-239.
Note of the appearances of a few species.
1844. MUMMERY, S. Kentish Birds. < *Ann. Mag. Nat. Hist.*, xiv, 1844, pp. 76, 77.
Field notes on a few species.
1844. NEWTON, A. Notes on the arrival of Summer Birds at Elveden and its vicinity in 1844. < *Zoologist*, ii, 1844, p. 651.
1844. NEWTON, A. Note on [with list of] the dates of Nidification of [sixty-three species of] Birds at Elden. < *Zoologist*, ii, 1844, pp. 722, 723.
1844. NEWTON, A. Correction of a previous Error [in the notice of the "Nidification of Birds at Elden"]. < *Zoologist*, ii, 1844, p. 768.
1844. NORMAN, G. Note on the arrival of Summer Birds at Hull, in 1844. < *Zoologist*, ii, 1844, p. 653.
1844. PAINE, T. Seltene Vögel bey Yarmuth. < *Oken's Isis*, Bd. xxxvii, 1844, p. 749.
Ann. Nat. Hist. Lond., Bd. iii, Heft xv, 1839, p. 140.

1844. PEACHEY, W. Note on the arrival of Summer Birds at Northchapel, near Petworth, in 1844. < *Zoologist*, ii, 1844, p. 650.
1844. RUDD, T. S. Note on dates of Migration at Redcar, near Guisborough. < *Zoologist*, ii, 1844, p. 440.
1844. SELBY, P. J. Table showing the period of Arrival of several Summer Birds of Passage, in the neighbourhood of Twizell-house, for the last twenty years. < *Zoologist*, ii, 1844, pp. 456-458.
From *Proc. Berwickshire Naturalists' Club*.
1844. THOMAS, F. E. Enquiry respecting Montagu's Snipe [*Scolopax montagui*] and the Roseate Tern [*Larus rosea*"]. < *Zoologist*, ii, 1844, p. 454.
1844. THOMPSON, W. Beiträge zur Naturgeschichte Irlands. < *Oken's Isis*, Bd. xxxvii, 1844, p. 517.
Mag. Zool. and Bot., Bd. i, Heft v, 1837, p. 459.
1844. THOMPSON, W. Beiträge zur Naturgeschichte Irlands. < *Oken's Isis*, Bd. xxxvii, 1844, p. 521.
Mag. Zool. and Bot., Bd. ii, 1838, pp. 42, 170, 427.
1844. THOM[P]SON, W. Beiträge zur Naturgeschichte von Irland, über die Hockvögel — Lebensart geschildert. < *Oken's Isis*, Bd. xxxvii, 1844, p. 571.
Ann. Nat. Hist., Bd. i, No. 1, 1838, p. 12.
1844. THOMPSON, W. Ueber die Wirkungen eines Sturms am 7ten Jänner 1839, in Irland auf die Vögel, Fische usw. < *Oken's Isis*, Bd. xxxvii, 1844, p. 751.
Ann. Nat. Hist., Bd. iii, Heft xv, 1839, p. 182.
1844. THOMPSON, W. Irische Vögel. < *Oken's Isis*, Bd. xxxvii, 1844, p. 930.
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1852. WHEELWRIGHT, H. W. Vergl. Verz. d. Vög. Skandinaviens u. Grossbritanniens. Carlstadt, 1852. 8vo.
 Nicht mir selbst zugänglich.
1853. BAIKIE, W. B. Additions to the List of Birds of Orkney and Zetland. < *Zoologist*, xi, 1853, p. 3843.
Noctua tengmalmi, *Ourruca cinerea*, *Bombycilla garrula*, *Totanus fuscus*.
1853. BURT, E. Occurrence of the Ivory Gull, &c. at Torquay. < *Zoologist*, xi, 1853, p. 3807.
1853. EDITORIAL. Bibliographical Notices. < *Ann. Mag. Nat. Hist.*, 2d ser., xi, 1853, pp. 236-244.
 Extended and appreciative review of Macgillivray's *History of British Birds*.
1853. FORSTER, T. "On the present season in relation to the Migration of Birds, and other Natural Phenomena." < *Zoologist*, xi, 1853, pp. 3805, 3806.
 From *Proc. Linn. Soc.*, May 21, 1851.
1853. GOSSE, P. H. Popular British Ornithology. . . . London. 1853.
 Not seen. The 2d. ed.; orig. ed., 1849.

1855. GURNEY, J. H. Note on the occurrence of the Pectoral Sandpiper [*Tringa maculata*] and Nutcracker [*Nucifraga caryocatactes*] near Yarmouth. < *Zoologist*, xi, 1853, p. 4124.
1853. GURNEY, J. H. Note on the supposed occurrence of the Apteryx in Anglesey, and on the capture of *Galbula ruficauda* in Lincolnshire. < *Zoologist*, xi, 1853, pp. 3944, 3945.
1853. JENNINGS, C. The Eggs of British Birds,
Not seen. This is said to be the date of the orig. ed. See the 2d ed., 1854.
1853. KINAHAN, J. R. Note on the Singing of Birds in Spring and Summer in Ireland. < *Zoologist*, xi, 1853, pp. 3980, 3981.
1853. [KNAPP, J. L.] Country Rambles | in | England; | or | Journal of a Naturalist [By J. L. Knapp]; | with notes and additions, | by | The author of "Rural Hours" [Miss S. Fenimore Cooper]. | [Quotation.] | Buffalo: | Published by Phinney & Co. | — | 1853. 1 vol. Frontisp., eng. title, pp. i-x. 11-336 + 1, 2 pl., 5 cuts.
At pp. 109-189, the reader may ramble among the birds, in the author's pleasant company. Appendix by the American editor. Note U, pp. 299-307, treats more formally of a selection of English species "most likely to interest the reader." Note W, on the Robin. Note X, on the Goldfinch. Note Y, on the Skylark. The work first appeared in England about 25 years before, but I have yet to see a copy of the original.
1853. MORE, A. G. Migratory Birds in the Isle of Wight. < *Zoologist*, xi, 1853, p. 4094.
1853. NEWTON, A. Note on singularly placed Nests of the Pheasant (*Phasianus Colchicus*) and Red-legged Partridge (*Perdix rufa*). < *Zoologist*, xi, 1853, pp. 4073, 4074.
1853. NORMAN, A. M. Note on the late Nidification of Birds [in Oxfordshire]. < *Zoologist*, xi, 1853, p. 4072.
1853. RODD, E. H. Occurrence of the Long-eared Owl (*Strix Otus*) and Fire-crested Regulus (*Regulus ignicapillus*) near Penzance. < *Zoologist*, xi, 1852, p. 3753.
1853. POWYS, T. L. Occurrence of the Sandwich Tern (*Sterna Boysii*) &c. [*Sterna minuta*, *Alca torda*] near Oxford. < *Zoologist*, xi, 1853, p. 3946.
1853. POWYS, T. L. Captures of various Birds in Oxfordshire. < *Zoologist*, xi, 1853, p. 3805.
1853. SMITH, A. C. Observations on the General Color and the occasional Variations in the Plumage of Birds. < *Zoologist*, xi, 1853, pp. 3969-3980.
Followed by a list of 57 spp. of British Birds, abnormal variations in the plumage of which have been recorded.
1853. STEPHENSON, J. W. Occurrence of the Blue-throated Warbler (*Sylvia suecica*), the Little Auk (*Uria Alle*), and the Black Redstart (*Sylvia Tithys*) near Worthing, in Sussex. < *Zoologist*, xi, 1853, p. 3907.
1853. THOMPSON, W. Supplementary Report on the Fauna of Ireland. < *Rep. Brit. Assoc. Adv. Sci. for 1852*, 1853, pp. 290-296.
Among birds, enumeration of 32 spp. not known as Irish at date of his *Report*, since ascertained to inhabit that country, with references to the authorities for the occurrences.
1853. WATERS, J. J. The Natural History of the Birds of Ireland, Indigenous and Migratory, containing Descriptions of the Habits, Migrations, Occurrence and Economy of the two hundred and sixty-one Species comprised in the Fauna. By John J. Watters, Associate Member of the University Zoological Association. Dublin: James McGlaishan. London. W. S. Orr & Co. 1853. 1 vol. 12mo. pp. 300.
Not seen. Is the author's name Walter or Watter, Walters or Waters?
"This volume deserves to be widely circulated, and we heartily recommend it to our readers. It abounds with anecdote, and is written in popular style. They will find it to be an accurate history of our Irish birds—detailing most of their interesting features."—*Nat. Hist. Rev.*, i, 1854, pp. 8-12.

1853. WHITE, G. (*Ed. Jardine.*) The | Natural History and Antiquities | of Selborne, | with | Observations on various parts of Nature, | and | The Naturalist's Calendar. | By the late Rev. Gilbert White, A. M. | A new edition. | Edited, with notes, by | Sir William Jardine, | Bart. F. R. S. E. F. L. S. &c. | Completely illustrated with about seventy engravings, | comprising | subjects from natural history, and views of Selborne, its vicinity | and antiquities, sketched from nature expressly | for this edition. | London: | Nathaniel Cooke, Milford House, Strand. | 1853. 1 vol. 8vo. Engr: title, pp. i-xviii, 1-342, 4 animal plates, and 60 other illustr.

I have handled this ed., of which Prof. Newton remarks: "This forms a volume of the 'National Illustrated Library,' and, though the woodcuts are of inferior quality, is a very good edition. Facing p. 2 is a map of the vicinity of Selborne."

1853. WHITE, G. (*Ed. Lady Dover.*) Natural History of Selborne, . . . New York: Harper Brothers. 1853. 1 vol. 18mo.

The original issue of the Harper edition was in 1841, which see.

1854. ANON. [Review of Watters' Natural History of the Birds of Ireland.] < *Nat. Hist. Rev.*, i, 1854, pp. 8-12.

1854. BIRKBECK, R. Remarks on a List of the Birds of West Cumberland [Zool. 4166]. < *Zoologist*, xii, 1854, p. 4366.

1854. BRIGGS, J. J. Note on a Hybrid between a Black Grouse and Pheasant. < *Zoologist*, xii, 1854, p. 4253.

1854. FARRAN, Dr. [Note on *Saxicola cenanthe* and *Anser brenta* in Ireland.] < *Nat. Hist. Rev. (Pr. Soc.)*, i, 1854, pp. 236, 237.

- [1854.] JENNINGS, C. The | Eggs of British Birds, | Displayed in a series of engravings, copied | and coloured from nature, | with descriptions of British Birds. | By C. Jennings. | The Illustrations by Dickes. | — | Second Edition. | — | Bath: Binns and Goodwin. | London: Low and Son, Agents; Longman; Simpkin; | Hamilton; Whittaker; | Edinburgh: Oliver and Boyd. Dublin: J. M'Glashan. | 1 vol. 12mo. n. d. [1854.] Eng. title, pp. i-xxii, 1-236, unnumbered coloured plates.

This second edit. seems to be enlarged, as I find the orig. ed., 1853 (which I have not seen), cited as of 232 pp. The author says: "I make no pretension to a scientific acquaintance with the department of Natural History to which the following chapters refer. My objects are, to excite or encourage," . . . &c. The book took well, and had a useful career.

1854. MONTGOMERY, [R. J.] [Exhibition of Irish-killed specimens of Great Cinereous Shrike and Black-capped Warbler.] < *Nat. Hist. Rev. (Pr. Soc.)*, i, 1854, p. 26.

1854. MONTGOMERY, R. J. [Remarks on exhibition of 3 spp. of Irish Birds.] < *Nat. Hist. Rev. (Pr. Soc.)*, i, 1854, p. 148.

1854. PICKARD-CAMBRIDGE, O. Occurrence of the Hoopoe [*Upupa epops*] and Oriole [*Oriolus galbula*] near Blandford. < *Zoologist*, xii, 1854, p. 4366.

1854. POWYS, T. L. Occurrence of various Birds [*Lanius excubitor*, *Lestris richardsonii*, and *Scolopax major*] in Oxfordshire. < *Zoologist*, xii, 1854, p. 4165.

1854. ROBERTS, A. Occurrence of Rare Birds [8 spp.] at Scarborough. < *Zoologist*, xii, 1854, p. 4331.

1854. ROBSON, J. A List of the Birds of West Cumberland. < *Zoologist*, xii, 1854, pp. 4166-4170.

176 spp. briefly annotated. Cf. *Zool.* 4366, 4406, 4407.

1854. ROBSON, J. Reply to Mr. Birkbeck's "Remarks on a List of Birds of West Cumberland" [Zool. 4166], by Mr. Joseph Robson, addressed to Walter Buchanan, Esq., F. L. S. < *Zoologist*, xii, 1854, pp. 4406, 4407.

1854. RODD, E. H. Provincial Names of Birds in Devonshire and Cornwall. < *Zoologist*, xii, 1854, p. 4255.

1854. RODD, E. H. Occurrence of Shinz's Tringa, the Hawfinch and White-fronted Geese at Scilly. < *Zoologist*, xii, 1854, p. 4512.

1854. SPICER, J. W. G. Note on Hybrid Gallinaceous Birds. < *Zoologist*, xii, 1854, pp. 4294-4296.
1854. SPICER, J. W. G. Occurrence of the Little Bittern and other [about 21] Rare Birds in Surrey. < *Zoologist*, xii, 1854, pp. 4366, 4367.
1854. THOMAS, M. W. B. Indications of Weather, as shown by Animals, Insects, and Plants. < *Edinb. New Philos. Journ.*, lvii, 1854, pp. 341-343.
Note on Birds in this connection, p. 341.
1854. WHITE, G. (*Ed. Jesse.*) The Natural History | of | Selborne; | with | Observations on various parts of Nature; | and | the Naturalist's Calendar. | By the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | With additional and supplementary notes by | Sir William Jardine, Bart. F. R. S. E., F. L. S., M. W. S. | Edited, with further illustrations, a biographical sketch of the author, | and a complete Index, by | Edward Jesse, Esq. | Author of "Gleanings in Natural History," &c. &c. | With forty engravings. | London: | Henry G. Bohn, York Street, Covent Garden. | 1854. 1 vol. 16mo. pp. i-xxiv, 1-416, 40 illust.
This I have handled. As the title shows, this is a Jardine "White," with further additions and illustrations by Jesse. Compare 1834, JESSE, W.
1854. WHITE, G. (*Ed. Wood.*) The | Natural History | of | Selborne. | By the late Rev. Gilbert White, A. M. | With additional notes, | by the Rev. J. G. Wood, M. A. | Author of the Illustrated Natural History, etc. | Illustrated with engravings on wood. | London: | George Routledge & Co. | Farringdon Street. | 1854. 1 vol. 8vo. pp. i-viii, 1-428.
Not seen. Title and comment from Newton, 1877.
This edition is very nicely printed; but the woodcuts are somewhat fanciful, and not very characteristic, nor do the notes betray the hand of a master.
1854. WRIGHT, E. P. Notes on the occurrence of rare Birds in Ireland, from February, 1853, to February, 1854. < *Nat. Hist. Rev. (Pr. Soc.)*, i, 1854, pp. 95-98.
1855. AKERMAN, J. Y. The Birds of London. < *Zoologist*, xiii, 1855, pp. 4702, 4703.
1855. ANDREWS, [W.] Notes on the south-west coast [of Ireland], and on the occurrence of the Great Shearwater (*Puffinus major*). < *Nat. Hist. Rev. (Pr. Soc.)*, ii, 1855, pp. 91-97.
1855. BREE, C. R. Birds killed by Cold [Stowmarket, 1855]. < *Zoologist*, xiii, 1855, p. 470.
1855. BREE, C. R. Rare Birds captured near Stowmarket. < *Zoologist*, xiii, 1855, pp. 4629-4631.
Colymbus arcticus, *Oidemia nigra*, *Ardea stellaris*, *Fringilla coccythraustes*.
1855. COLLINGWOOD, C. Birds in the Neighbourhood of Blackheath in 1854. < *Zoologist*, xiii, 1855, pp. 4592-4594.
1855. COLLINGWOOD, C. Calendar of Natural Phenomena observed at Purley Park, Berkshire. < *Zoologist*, xiii, 1855, pp. 4725-4738.
Chiefly ornithological.
1855. D'URBAN, W. S. M. Occurrence of the Spotted Crake [*Crex porzana*] and Avocet [*Recurvirostra Avocetta*] on the Exe. < *Zoologist*, xiii, 1855, pp. 4895, 4896.
1855. GATCOMBE, J. Occurrence of the Iceland Gull [*Larus leucopterus*] and other Scarce Birds in the Neighbourhood of Plymouth. < *Zoologist*, xiii, 1855, p. 4705.
1855. GRANTHAM, G. Occurrence of the Little Ringed Plover [*Hiaticula minor*] and Snew [*Mergellus albellus*] near Brighton. < *Zoologist*, xiii, 1855, p. 4762.
1855. HUSSEY, A. Occurrence of the Short-toed Lark (*Alauda brachydaetyla*) and of the Lapland Bunting (*Emberiza Lapponica*) in Sussex. < *Zoologist*, xiii, 1855, p. 4558.

1855. KINAHAN, R. J. Local List of Birds found in the County Dublin. < *Nat. Hist. Rev. (Pr. Soc.)*, ii, 1855, pp. 22-25, 26-28.
Fully annotated.
1855. KNOX, A. E. Ornithological Rambles | in Sussex; | with a systematic catalogue | of | the Birds of that County, | and | remarks on their local distribution. | By | A. E. Knox, M. A., F. L. S., &c. | — | Third Edition. | — | London: | John Van Voorst, i, Paternoster Row. | MDCCCLV. 1 vol. 12mo. pp. iii-xii, 1-260, 4 illust. by Wolf.
Orig. ed. 1849; 2d ed. 18—.
"In sending forth a Third Edition of his 'Ornithological Rambles,' the Author has not thought it necessary to make any essential alterations in the former part of the work, but those who may feel an interest in the occurrence of new or rare species within the limits of the county, will find some additional information on this subject in the Systematic Catalogue at the end of the volume."
The original lithographs, after the author's drawings, having been worn out, are superseded in this ed. by four of Wolf's spirited illustrations.
1855. MORRIS, B. R. British | Game Birds | and | Wild fowl. | By | Beverley R. Morris, Esq., A. B., M. D., T. C. D., | Memb: Wern: Club. | — | Illustrated with sixty coloured plates. | — | London: | Groombridge and Sons, Paternoster Row. | — | 1855. 1 vol. Large 4to. pp. i-iv, 1-252, with 60 unnumbered col'd plates.
This is a beautiful and luxurious volume. The text is of general character, for the most part a leaf of it to a plate. Some 60 or 70 species are treated. The plates are brilliant; and if the author had numbered them, so that I could cite them, I would do so with pleasure.
I imagine, without knowing, that the work may have been published in parts, not necessarily all of the date above given.
1855. POWYS, T. L. Occurrence of the Bittern [*Botaurus stellaris*] and Goosander [*Mergus merganser*] in Northamptonshire, and of the Red-throated Diver [*Colymbus septentrionalis*] in Plymouth Sound. < *Zoologist*, xiii, 1855, p. 4762.
1855. ROBERTS, A. Occurrence of Wild Fowl at Scarborough. < *Zoologist*, xiii, 1855, pp. 4660.
1855. ROBERTS, A. Occurrence of the Shag (*Carbo cristatus*), the American Scaup (*Fuligula maritoides* [sic]) and the Continental Wagtail near Scarborough. < *Zoologist*, xiii, p. 4631.
1855. ROBERTS, A. Rare Birds killed near Scarborough. < *Zoologist*, xiii, 1855, p. 4558.
1855. SMITH, J. A. [Exhibition before Roy. Phys. Soc., Mar. 28, 1855, of several British Birds.] < *Edinb. New Philos. Journ.*, new ser., ii, 1855, p. 194.
1855. STEVENSON, H. Winter Visitors to the Norfolk Coast during the late severe weather. < *Zoologist*, xiii, 1855, p. 4660.
1855. STEVENSON, H. Wild Fowl on the Norfolk Coast. < *Zoologist*, xiii, 1855, p. 4704.
1855. WHITE, G. (*Ed. Lady Dover.*) Natural History of Selborne. . . . New York: Harper Brothers. 1855. 1 vol. 18mo.
The original issue of the Harper edition was in 1841, which see.
- 1856-59. ANDREWS, W. Notes on the Ornithology of the County of Kerry. *Dublin Nat. Hist. Soc. Proc.*, iii, 1856-59, pp. 51-55.
Not seen: title from Roy. Soc. Cat.; actual date in question.
1856. BURKITT, DR. Occurrence of Rare Birds in Ireland. < *Nat. Hist. Rev. (Pr. Soc.)*, iii, 1856, pp. 26, 27.
1856. COCKS, W. P. Rare British Birds. < *Ann. Mag. Nat. Hist.*, 2d ser., xviii, 1856, p. 430.
3 spp.—*Sterna arctica*, *S. hirundo*, *Thalassidroma pelagica*.
1856. DALE, J. C. Popular Fallacies about [certain British] Birds. < *Zoologist*, xiv, 1856, p. 4994.
1856. D'URBAN, W. S. M. Note on the Early Arrival of the Sand Martin [*Cotyle riparia*] and Chiffchaff [*Sylvia hippolais*]. < *Zoologist*, xiv, 1856, p. 5098.

- 1856-60. EDWARD, T. A List of the Birds of Banffshire, accompanied with Anecdotes. < *Zoologist*, xiv, 1856, pp. 5117-5122, 5199-5202, 5258-5263; xvii, 1859, pp. 6595-6601, 6631-6637, 6665-6672; xviii, 1860, pp. 6841-6849, 6964-6975.
1856. GATCOMBE, J. Occurrence of the Great Plover [*Ædienemus crepitans*] and Spotted Crane [*Crex porzana*] in Devonshire. < *Zoologist*, xiv, 1856, p. 4946.
1856. GURNEY, J. H. Rare Birds procured in Norfolk and Suffolk. < *Zoologist*, xiv, 1856, p. 5159.
Sylvia cyaneola, *Oriolus galbula*, *Tringa platyrhyncha*.
1856. GURNEY, J. H. Remarkable Destruction of Sea Birds on the Norfolk Coast. < *Zoologist*, xiv, 1856, p. 5159.
1856. "HESPERUS." A Glance over the Cliffs of Moher (County Clare, Ireland). < *Zoologist*, xiv, 1856, pp. 4941, 4942.
On the birds there seen.
- 1856? HEWITSON, W. C. British Oology; | being | Illustrations | of the | Eggs of British Birds, | with figures of each species, | as far as practicable, | drawn and coloured from nature: | accompanied by | descriptions of the and situation of their nests, | number of eggs, &c. | By William C. Hewitson. | — | Vol. I [II]. | — | [Quotation.] | — | Newcastle upon Tyne: | Published for the Author, | By Charles Empson, 32, Collingwood Street. | [n. d.] 2 vols. Large 8vo. Not paged, 169 pll. col'd.
- I am very imperfectly acquainted with this work. The edition here cited, which I suppose to be a "3d ed., 2 vols., 1856", is neither dated nor paged; has the species arranged systematically, with the addition, at the end of Vol. II, of 15 species to the 229 before treated, raising the total number of plates to 169, each representing the egg of one or more species, in colours, natural size. The work was originally published (by subscription) in parts. I find it cited "8vo, London, 1831-1844", and also "3 vols, 8vo, London, 1831-1836".
1856. HOLME, F. Letters on Natural History. < *Zoologist*, xiv, 1856, pp. 5034-5044.
Date 1834. Chiefly on British Birds. "Replete with those records and observations which give to White's 'Selborne' its enduring interest."
1856. KRÜPER, T. [Auszüge aus W. Thompson's „Natural History of Ireland“.] < *Naumannia*, vi, 1856, pp. 77, 78.
Teber Sturnus vulgaris, *Bonasa europæa*, *Aquila chrysaetos*.
1856. LISTER, T. Notices of Rarer Birds about Barnsley [Yorkshire]. < *Zoologist*, xiv, 1856, p. 4942.
1856. STEVENSON, H. Occurrence of the Rose-coloured Pastor [Pastor roseus], Merlin [Falco aesalon] and Peregrine [F. peregrinus] in Norfolk. < *Zoologist*, xiv, 1856, p. 5320.
1856. STEVENSON, H. Note on the Iceland Gull and the Shore Lark in Norfolk. < *Zoologist*, xiv, 1856, p. 4947.
1856. TUCK, E. J. Occurrence of the Rose-coloured Pastor [Pastor roseus] and Hoopoe [Upupa epops] in Essex. < *Zoologist*, xiv, 1856, pp. 5319, 5320.
1856. TUCK, E. J. Occurrence of the Rose-coloured Pastor [Pastor roseus] and Woodchat Shrike in Hertfordshire. < *Zoologist*, xiv, 1856, pp. 5203, 5204.
1856. YARRELL, W. A | History | of | British Birds. | By | William Yarrell, V. P. L. S. F. Z. S. | Illustrated by 550 wood-engravings. | In three volumes.—Vol. I [—III]. | Third Edition, with many additions. | London: | John Van Voorst, Paternoster Row. | M. DCCC. LVI. 3 vols. 8vo. Vol. I, pp. i-xxxv (title, preface and index), 1-614. Vol. II, pp. 702. Vol. III, pp. 679.
1856. YARRELL, W. Second Supplement | to the | History | of | British Birds: | being also a | First Supplement to the Second Edition. | By William Yarrell, V. P. L. S. F. Z. S. | Illustrated with 18 wood-engravings. | London: | John Van Voorst, Paternoster Row. | M. DCCC. LVI. pp. i-x (title and preface), 1-72.
See the 2d ed., 1845, and the orig. ed., 1837-43.

1857. ANDREWS, W. Notes on the Ornithology of the County of Kerry. < *Nat. Hist. Rev. (Pr. Soc.)*, iv, 1857, pp. 162-165.
With reference to several stragglers. Remarks by J. B. Doyle.
1857. ANON. British Land Birds. London, Religious Tract Society. 1857. 12mo. pp. 282.
Not seen.
1857. CLERMONT, Lord. Occurrence of the Eared Grebe [*Podiceps auritus*] and Night Heron [*Nycticorax ardeola*] in Ireland. < *Zoologist*, xv, 1857, p. 5429.
1857. COCKS, W. P. Rare British Birds. < *Ann. Mag. Nat. Hist.*, 2d ser., xix, 1857, p. 107.
Only one sp., *Thalassidroma leachii*.
1857. CREWE, H. H. Note on the Robin (*Sylvia rubecula*) and Butcher Bird (*Lanius collurio*). < *Zoologist*, xv, 1857, p. 5516.
1857. DUNN, R. Rare Birds in Orkney. < *Zoologist*, xv, 1857, pp. 5791, 5792.
1857. GATCOMBE, J. Occurrence of Rare Birds near Plymouth in 1856. < *Zoologist*, xv, 1857, p. 5593.
1857. HEPBURN, A. "Notes on some of the Mammalia and Birds found at El. Abbs Head.—Proceed. of the Berwickshire natur. Club 1857. 70."
Not seen: title and reference copied from Giebel.
1857. LAISHLEY, R. A popular History of British Birds' Eggs. London. 1857. 16mo. pp. 310.
Not seen.
1857. MATHEWS, M. A. Stray Notes from an Ornithologist's Diary during the past Summer [North Devon, England]. < *Zoologist*, xv, 1857, pp. 5345-5348.
1857. RODD, E. H. Autumnal Migratory Movement: Scilly Isles. < *Zoologist*, xv, 1857, p. 5789.
1857. SHEPHERD, C. W. Occurrence of the Avocet (*Recurvirostra avocetta*) and Rose-coloured Pastor (*Pastor roseus*) near Rochester. < *Zoologist*, xv, 1857, p. 5519.
1857. WARREN, R. Notes on the Natatores of Killala. < *Nat. Hist. Rev. (Pr. Soc.)*, iv, 1857, pp. 50-56.
1858. EDWARD, T. Occurrence of [6 spp. of] Rare Birds near Banff. < *Zoologist*, xvi, 1858, pp. 6268-6270.
1858. MATHEWS, M. A. Occurrence of the Norfolk Plover [*Oedinenus crepitans*] and the Ruff [*Machetes pugnax*] near Barnstaple. < *Zoologist*, xvi, 1858, p. 6264.
1858. MATHEWS, M. A. Occurrence of Rare Birds near Barnstaple. < *Zoologist*, xvi, 1858, pp. 6014, 6015.
1858. MILNER, W. M. E. The Glossy Ibis and Yellowlegged Sandpiper [*Totanus flavipes*] killed in Yorkshire. < *Zoologist*, xvi, 1858, p. 5958.
1858. MORE, A. G. Migratory Birds in the Isle of Wight. < *Zoologist*, xvi, 1858, pp. 6270, 6271.
1858. NEWMAN, H. W. Movements of Swifts and Migratory [British] Birds. < *Zoologist*, xvi, 1858, p. 5958.
1858. ROGERS, F. Occurrence of Wild Geese in the Isle of Wight. < *Zoologist*, xvi, 1858, p. 6097.
1858. SLANEY, W. H. White Thrushes, Blackbirds, &c. < *Zoologist*, xvi, 1858, pp. 6141, 6142.
1858. SMURTHWAITE, H. Occurrence of the Hoopoe and Pied Flycatcher in Yorkshire. < *Zoologist*, xvi, 1858, p. 6093.
1858. TUCK, E. J. Nesting of Swallows and other [British] Birds. < *Zoologist*, xvi, 1858, pp. 5920, 5921.
1858. WALKER, J. S. A Plea for Birds. < *Zoologist*, xvi, 1858, pp. 6092, 6093.

1858. WHITE, G. (*Ed. Blyth.*) The | [Nat. Hist. of Selborne, etc., . . .] Blyth. | To which is added | a Description of the Village and Neighbourhood, | written on the spot for this Edition, | by the late Robert Mudie, | Thomas Nelson & Sons, | London, Edinburgh, and New York. | MDCCCLVIII.
A stereotyped reissue of the Blyth ed. of 1836, with a new title-page, &c., the omission of the former printer's name at the end and the addition of the new printer's (Thomas Harrild) name, monogram and address on the page following title, and of double marginal lines round each page.
1859. ARMSTRONG, T. Occurrence of Rare Birds [6 spp.] near Carlisle. < *Zoologist*, xvii, 1859, p. 6378.
- 1859-60. BELL, T. B. Notes from the neighborhood of Stranaer on the Chough or Red-legged Crow (*Fregilus graculus*); on the migration of the Swift (*Cypselus apus*, Flem.); and on the effects of the severe gale on the 9th Sept. last. < *Edinb. Proc. Phys. Soc.*, ii, 1859-60, pp. 143-145.
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With remarks by R. J. Montgomery and R. Warren.
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1859. MATHEWS, M. A. Autumn Notes on [some British] Birds. < *Zoologist*, xvii, 1859, pp. 6761-6763.
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1859. MORE, A. G. Remarks on the Migration of [British] Birds. < *Zoologist*, xvii, 1859, pp. 6531-6534.
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1859. ROBERTS, A. Kite, Hoopoe and Golden Oriole shot near Scarborough. < *Zoologist*, xvii, 1859, p. 6561.
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Nominal list of species observed during 15 years.
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1860. NEWMAN, H. W. Occurrence of the Alpine Accentor (*Accentor alpinus*) near Cheltenham, and the Glossy Ibis (*Ibis falcinellus*) in Somersetshire. < *Zoologist*, xviii, 1860, p. 6889.
1860. RAKES, T. B. [Suggestions with reference to a new 'Ibis' List of British Birds, the 'Zoologist' one being regarded as objectionable.] < *Ibis*, ii, 1860, pp. 430, 431.
1860. ROBERTS, A. Rare Birds at Scarborough. < *Zoologist*, xviii, 1860, p. 6807.
1860. RODD, E. H. Sport at the Scilly Isles. < *Zoologist*, xviii, 1860, p. 6307.
1860. ROWLEY, G. D. [Letter from Brighton on some Charadriide, and other matter.] < *Ibis*, ii, 1860, pp. 101, 102.
1860. ROWLEY, G. D. [Letter on *Falco peregrinus*, *Procellaria leachii*, hybrid of *Fringilla chloris* and *F. cannabina*, observed at Brighton, England.] < *Ibis*, ii, 1860, pp. 200, 201.
1860. SAVILLE, J. P. Note on a Variety [albinotic] of the Chaffinch (*Fringilla cœlebs*), and on a Coot (*Fulica atra*) found in an odd situation [kitchen area]. < *Zoologist*, xviii, 1860, p. 6890.
1860. SMITH, [J. A.] [Remarks on exhibition before the Roy. Phys. Soc. of several British Birds.] < *Edinb. New Philos. Journ.*, new ser., xii, 1860, p. 153.
1860. STEVENSON, H. Ornithological Notes from Norfolk: unusual Number of Hawfinches [etc.]. < *Zoologist*, xviii, 1860, pp. 6921, 6922.
1860. STEVENSON, H. Ornithological Occurrences in Norfolk. < *Zoologist*, xviii, 1860, pp. 6806, 6807.
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1860. WHITE, G. (*Ed. Lady Dover.*) The | Natural History of Selborne. | By | the Rev. Gilbert White, A. M., | Fellow of Oriel College, Oxford. | [Engraving.] | New York: | Harper & Brothers, Publishers, | 329 & 331 Pearl street, | Franklin Square. | 1860. 1 vol. 18mo. pp. i-xii, 13-235, many woodcut.

Copyright 1841, *q. v.*, the date of the orig. issue of the American reprint of this edition, which was several times issued at irregular periods, a few hundred copies at a time. A note to me, recently (1879) obligingly furnished by the publishers, giving memoranda of the dates of successive issues, includes one of "1859," but not one of 1860. As I have handled a copy dated 1860, it may be that 1859 was the actual date of issue of copies post-dated "1860," rather than that there was one of 1859 and one of 1860 too.

This is apparently a very faithful reprint of Lady Dover's edition (cf. 1833), from which most of the woodcuts are reproduced, those in the first part (to Pennant) being reversed, while those in the second (to Barrington) are not. However, two (pp. 31 and 223) are substituted for the English originals, and do not reflect much credit on the draughtsman.

- †1860. WHITE, G. (*Ed. Lady Dover.*) The Natural History of Selborne. . . .

According to Carus and Engelmann, *Bibl.*, p. 1627, an edition of the "Bowdlerized" edition was published this year by the Society for Promoting Christian Knowledge, with figures by Wolf, probably the same as those of the ed. of 1870 or 1871.

1861. ATKINSON, J. C. British | Birds' Eggs and Nests, | popularly described. | By | Rev. J. C. Atkinson, | author of [etc.]. | With coloured illustrations by W. S. Coleman. | London | Routledge, Warne, & Routledge, | Farringdon street. | New York: 56, Walker street. | 1861. 1 vol. 12mo. pp. viii, 182, pll. col'd 12.
Very well-written and acceptable book, doubtless found useful by many: illustrations characteristic and helpful, if not highly artistic. Cf. *Ibis*, 1861, p. 400.
1861. COLLINGWOOD, C. Contributions to British Ornithology—The Notes of Birds. By Cuthbert Collingwood, M. A., F. L. S., &c. From the Proceedings of the Liverpool Literary and Philosophical Society. Read April 15, 1861. 8vo. pp. 26.
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1861. NEWMAN, E. Birds'-nesting: being a complete description of the Nests and Eggs of Birds which breed in Great Britain and Ireland. By Edward Newman. . . . London. 1861. 8vo. pp. 52.
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1861. RAKE, B. [Letter expressing his sense of the desirability of a reliable list of British Birds.] < *Ibis*, iii, 1861, pp. 210, 211.
1861. RAKE, B. [Remarks offered in hope of instigating a reliable List of British Birds.] < *Ibis*, iii, 1861, pp. 307–309.
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1862. ANSTED, D. T., and LATHAM, R. G. The Channel Islands. By David Thomas Ansted and Robert Gordon Latham. London. 1862. 1 vol. 8vo.
Not seen. List of 198 spp., with notes on the general character of the Bird-fauna.
1862. BARTLETT, J. P. Occurrence of the Short-toed Lark (*Alauda brachyactyla*) and other rare Birds in Hampshire. < *Zoologist*, xx, 1862, pp. 7930, 7931.
1862. BRIDGER, W. Occurrence of the Hoopoe and Spoonbill in Surrey. < *Zoologist*, xx, 1862, p. 8283.
1862. BRUNTON, T. Shorteared Owl and Roughlegged Buzzard near Bishop Stortford. < *Zoologist*, xx, 1862, p. 7844.
1862. DUNS, J. On the Nesting Birds of Linlithgowshire and Berwickshire. < *Edinb. New Philos. Journ.*, new ser., xv, 1862, pp. 295–298.
Revised, annotated list of the breeders, regular, past, and occasional.
1862. EDITORIAL. [Notice of J. Gould's forthcoming Birds of Great Britain.] < *Ibis*, 1862, p. 392.
1862. EDMUNDS, A. Occurrence of rare Birds near Worcester. < *Zoologist*, xx, 1862, pp. 8198, 8199.
1862. GATCOMBE, J. Occurrence of the Iceland Gull [*Larus leucopterus*] and Red-necked Grebe [*Podiceps rubricollis*] at Plymouth. < *Zoologist*, xx, 1862, p. 784.
1862. GILBERT, R. H. T. White Specimens of Redthroated Diver and Lapwing. < *Zoologist*, xx, 1862, pp. 8002, 8003.
- 1862-73. GOULD, J. The | Birds | of | Great Britain. | By | John Gould, F. R. S., &c. | — | In Five Volumes. | — | Volume I [-V]. | London: | printed by Taylor and Francis, Red Lion Court, Fleet Street. | Published by the author, 26, Charlotte Street, Bedford Square. | [1862–] 1873. 5 vols. imp. folio. Vol. I, 6 p. ll. (title, dedication, subscribers, preface), pp. i–exl (introduction: synopsis of 409 spp.), list of plates 1 leaf, pll. 1–37. Vol. II, 2 p. ll., pll. 1–78. Vol. III, 2 p. ll., pll. 1–76. Vol. IV, 2 p. ll., pll. 1–90. Vol. V, 2 p. ll., pll. 1–86. To each

1862-73. GOULD, J.—Continued.

plate a sheet or so of letter-press, not paged. Plates (37 + 78 + 76 + 90 + 86 =) 367. Pub. in 25 semi-annual Parts, 1862-73; furnishings with last Part.

Parts i, ii, 1862: iii, iv, 1863; v, vi, 1864: vii, viii, 1865; ix, x, 1866; xi, xii, 1867; xiii, xiv, 1868; xv, xvi, 1869; xvii, xviii, 1870; xix, xx, 1871; xxi, xxii, 1872; xxiii-xxv, 1873. With the last part were issued the permanent titles, &c., for the 5 vols. in which the work is directed to be made up, including pp. i-exl of introduction. This consists of a synopsis of the 409 spp. of which the work treats. The regular text is not paged; it consists of a sheet or so to each plate. The pls. are not numbered. They were not issued in any systematic order; but are designed to be rearranged systematically in 5 series, one to each vol. as above indicated, and are enumerated conformably to the printed lists: being citable by number according to these lists. The plan of publication is thus like that of all the rest of Gould's famous works. I have only seen the work as made up, and cannot, therefore, give the cover-title by which it was alone known for so many years, and which differs from the permanent title above cited.

"This grand work, which was begun in 1862, is continued at the rate of two parts every year. The plates, as regards beauty and finish, far exceed those in any other of the author's well-known publications. . . . A good deal of care has been bestowed on the letter-press, which is much more comprehensive than in the majority of Mr. Gould's books. Figures of the nestings of many of the species are also introduced to an extent greater than in any other work of the kind with which we are acquainted, excepting perhaps Naumann's 'Vögel Deutschlands.'" (*Zool. Rec.* for 1864, p. 42.)

1862. HILDEBRAND, A. H. The Goosander and Spotted Rail in Leicestershire. < *Zoologist*, xx, 1862, pp. 7847, 7848.

1862. JOHNS, C. A. British Birds | in their Haunts. | By the | Rev. C. A. Johns, B. A. F. L. S. | Author of "Forest Trees of Britain;" "Flowers of the Field," | etc. | With illustrations on wood, | drawn by Wolf, engraved by Whymper. | — | Published under the direction of the | committee of general literature and education, appointed by | the Society for promoting Christian Knowledge. | — | London: | Society for Promoting Christian Knowledge; | [etc., 4 lines.] | — | 1862. 1 vol. 16mo. pp. i-xxxii, 1-626, with 190 woodcuts.

This interesting and beautifully illustrated volume contains an account, more or less detailed, of all the birds figured in the 2d ed. of Yarrell, with additions to date. The author makes out the British list to be: resident all the year, 140; summer visitors, 63; winter visitors, 48; capricious visitors, 110; total, 361. The author has certainly, as he ventured to hope, provided the lover of nature with a pleasant companion in his country walks, and the young ornithologist with a manual which will supply his present needs and prepare him for the study of more important works.

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1862. MORE, A. G. Early Arrival of Migratory Birds [in the Isle of Wight]. < *Zoologist*, xx, 1862, pp. 8026, 8027.

1862. NEWMAN, H. W. Mildness of the Season [winter 1861-2 at Cheltenham]. < *Zoologist*, xx, 1862, pp. 7929, 7930.

1862. NEWMAN, H. W. The Song of [certain British] Birds. < *Zoologist*, xx, 1862, pp. 7829, 7830.

1862. REAKS, H. Notes on Nests [of a few British Birds]. < *Zoologist*, xx, 1862, pp. 8098, 8099.

1862. RODD, E. H. Dates of Appearance and Song of a few of our Migratory Birds near Penzance. < *Zoologist*, xx, 1862, p. 8037.

1862. ROWLEY, G. D. [Letter on various Birds observed at Brighton, England.] < *Ibis*, iv, 1862, pp. 88, 89.

1862. SMITH, J. A. Ornithological Notes [on a few Scottish Birds]. < *Edinb. New Philos. Journ.*, new ser., xv, 1862, pp. 305, 306.

1862. STEVENSON, H. Occurrence of Shore Larks, Little Auks, Gray Phalarope, &c., in Norfolk. < *Zoologist*, xx, 1862, p. 7845.

1862. STEVENSON, H. Note on the Spotted Redshank, Caspian Tern, Spoonbill, &c., at Yarmouth. < *Zoologist*, xx, 1862, p. 8093.

1862. STEVENSON, H. Note on the Shore Lark (*Alauda alpestris*) and Little Owl (*Strix passerina*) in Norfolk. < *Zoologist*, xx, 1862, p. 7931.
1862. STOWELL, H. A. Chit-chat, chiefly Ornithological, from the Isle of Man. < *Zoologist*, xx, 1862, pp. 7848, 7849.
1862. SAXBY, H. L. Ornithological Notes from Edinburgh. < *Zoologist*, xx, 1862, p. 7880.
1862. SHEWELL, J. Nesting of Martins and Sparrows [in Great Britain]. < *Zoologist*, xx, 1862, p. 8194.
1862. THOMPSON, T. Dates of Arrival and Nesting of [a few British] Birds. < *Zoologist*, xx, 1862, p. 8160.
1862. VARLEY, J. Occurrence of the Manx Shearwater, Thickknee and Croosbills in the Neighbourhood of Huddersfield. < *Zoologist*, xx, 1862, p. 8005.
1863. ATKINSON, J. C. Nests of the Common Wren and the Golderest. < *Zoologist*, xxi, 1863, pp. 8680, 8681.
1863. BENNETT, E. T. Food of Small [British] Birds. < *Zoologist*, xxi, 1863, pp. 8814, 8815.
1863. BLAKE-KNOX, H. Purple Sandpiper, Iceland Gull and other rare Birds at Dalkey. < *Zoologist*, xxi, 1863, pp. 8447, 8448.
1863. BLAKE-KNOX, H. Ornithological Notes between Bristol and Dublin. < *Zoologist*, xxi, 1863, p. 8523.
1863. BLAKE-KNOX, H. Correction of an Error [Zool., 8523]. < *Zoologist*, xxi, 1863, p. 8678.
1863. BOULTON, W. W. Scarcity of Summer Migratory Birds in the East Riding of Yorkshire. < *Zoologist*, xxi, 1863, p. 8726.
1863. BRUNTON, T. Blackbirds' and Treecreepers' Nests on the Ground. < *Zoologist*, xxi, 1863, pp. 8679, 8680.
1863. FRASER, L. [List of birds captured or observed by Mr. E. Bartlett, in the Society's Gardens.] < *P. Z. S.*, xxxi, 1863, pp. 159, 160.
1863. GATCOMBE, J. The Little Auk and Spotted Crake in Devonshire. < *Zoologist*, xxi, 1863, p. 8832.
1863. GRAY, G. R. Catalogue | of | British Birds | in the | Collection of the British Museum. | By | George Robert Gray, F. L. S., F. Z. S., &c. | London: | Printed by order of the Trustees. | 1863. 1 vol. 8vo. pp. i-xii, 1-247 + 1 + 8.
- A complete list of the species of Birds which have been found in Great Britain and Ireland, with a very copious synonymy, and indication by localities of specimens in the Br. Mus., &c.; synonyms of genera and higher groups, as well as of species. The supplementary pages are bibliographical, with special reference to works illustrating the Br. Mus. Coll. Indigenous spp., 115; seasonal visitors, 84; occasional visitors, 112; accidental visitors, 72 (+ 2 in app.); introduced spp., 11; doubtful, 7; total, 401 + 2.
1863. HARTING, J. E. A List of [10 spp. of] Waders that have occurred at Kingsbury Reservoir during the Summer of 1863. < *Zoologist*, xxi, 1863, pp. 8828-8831.
1863. JEFFREY, W., JR. Scarcity of certain Summer Birds [in Chichester]. < *Zoologist*, xxi, 1863, p. 8816.
1863. NEWMAN, H. W. Food of Small [British] Birds. < *Zoologist*, xxi, 1863, p. 8815.
1863. NEWMAN, E. *Acanthylis caudatus* and *Reguloides superciliosus* [as British Birds]. < *Zoologist*, xxi, 1863, p. 8329.
1863. NORMAN, G. Alleged Scarcity of Swifts and Swallows [at Beverley]. < *Zoologist*, xxi, 1863, p. 8767.
1863. PRESTON, T. A. The Flora of Marlborough with a notice of the Birds and a sketch of the geological features, . . . London, 1863.

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1863. READING, J. J. Rare Birds in Devonshire. < *Zoologist*, xxi, 1863, p. 8448.
1863. ROBERTS, G. On the Nidification of Small [British] Birds. < *Zoologist*, xxi, 1863, pp. 8630, 8631.
1863. ROBERTS, G. Dates of Arrival of the Summer Birds [in Wakefield in], 1863. < *Zoologist*, xxi, 1863, p. 8771.
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1863. RODD, E. H. Little Ring Plover at Seilly, with a glance at the Autumnal Visit of Migratory Birds at the Islands. < *Zoologist*, xxi, 1863, pp. 8847-8849.
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ing Rowe, F. L. S., &c. Plymouth, 1863. (London. Van Voorst.)
Not seen.—The first List of the Birds of that County (the home of Montagu, author of the *Dictionary*) for a quarter of a century (cf. Moore, *Charlesworth's Mag.*, 1837). 268 spp.
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1863. SMITH, J. A. Ornithological Notes [on a few Scottish Birds]. < *Edinb. New Philos. Journ.*, new ser., xvii, 1863, pp. 313, 314.
1863. SMITH, R. B. Flora of Marlborough; | with notices of the Birds, | and | a sketch of the geological features | of the | neighbourhood, | [by T. A. Preston,] | with a Map. | London: | John Van Voorst, Paternoster Row. | MDCCCLXIII. | 1 vol. 12mo. pp. xxiv, 129, + 1 l. (photog. map.)
Birds by R. B. Smith, pp. 103-116, 127-129; a briefly annotated list of 102 spp.
1863. STUBBS, C. Eggs of the Cuckoo: Nests of Water Rail, Hawfinch and Tree Creeper. < *Zoologist*, xxi, 1863, p. 8681.
1863. STUBBS, C. Nesting and Eggs of various [British] Birds. < *Zoologist*, xxi, 1863, p. 8818.
1863. TURNBULL, W. P. Birds | of | East Lothian and a portion of | the adjoining counties, | from | memorandums made between 1845-1850, | by | William P. Turnbull, | Gladsmuir, | Member of the Academy of Natural Sciences of Philadelphia. | [Quotation, 5 lines.] | [Seal.] | Philadelphia: | Caxton Press of C. Sherman, Son & Co. | n. d. [1863.] 1 vol. 8vo. pp. 16.
Summer visitants, 42; winter visitants, 44; pass in spring and autumn, 4; permanently resident, 84; stragglers or irregular visitants, 29; = 201. There is a vignette ed., 1867, q. v.
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Reissue, identical with the orig. ed. of 1851-57. The author states plainly the aim of the work, in his preface of 1857: 1, To collect, as far as he could, all known facts in the Nat. Hist. of every British Bird; 2, To produce a readable book; 3, To give correct and life-like figures; 4, To do this at the lowest possible cost. The work was originally issued in monthly numbers, each containing four coloured plates, and most of them 24 pp. of text.
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1866. HARTING, J. E. The | Birds of Middlesex. | A contribution | to | The Natural History of the County. | By | James Edmund Harting, F. Z. S. | — | London: | John Van Voorst, 1, Paternoster Row. | M. DCCC. LXVI. 1 vol. post 8vo. pp. i-xvi, 1-284, flat-tinted frontisp. and a few cuts.
- Not less than 225 species of Birds have been found in Middlesex, of which 60 are resident, 68 migratory, and 97 rare and accidental visitants. The plan of the work is modeled after Yarrell. The musical notation of the notes of various birds are given. The work is written by a well-known and accomplished field ornithologist, and has a high standing; being, in fact, the chief authority upon the birds of this locality. It is based entirely upon his personal observations in the field, and may be regarded as perfectly reliable, besides being written in an interesting manner. Cf. *Ibis*, 1867, p. 123.
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Montagu's celebrated 'Dictionary' was originally published in 2 vols. in 1802, with a supplement in 1813. The additions which the author made exceeded the original work in bulk. Rennie's edition, being the 2d, appeared in 1831.

In the present greatly enlarged and modified edition the whole of his 'Dictionary,' 'Supplement,' and 'Appendix' are reprinted in a combined and alphabetical order, the words "supplement" and "appendix" being prefixed to whatever is derived from these two sources. "Nothing that Montagu has published is omitted or altered." Newman's additions, chiefly derived from Selby, Yarrell, and the pages of the 'Zoologist,' are marked by inverted commas, with references to those works. Immediately after a name is inserted a reference to the bird and its egg, Yarrell's 'History' (3d ed.) and Hewitson's 'Oology' (3d ed.) being selected for this purpose; these and other editorial interpolations being bracketed.

This is the most convenient form in which Montagu is found, this author's originally separated instalments of his work being here brought together in proper order, and much new editorial matter of value being added.

The editor says:—"I desire explicitly to state that I have taken nothing from the text of the original work; and in the second place, I have added scarcely anything of my own: in no instance have I overlaid the original with my own observations, altered the author's obvious meaning to suit my own views, or attempted to controvert his assertions because at variance with my own more limited experience; nevertheless important additions have been made, as I will endeavor to explain." The gist of the additions are:—a) 24 species added by Selby to those of Montagu; 59 in Yarrell additional to Selby; 21 more in the *Zoologist*, and 2 in the *Ibis*;

1866. MONTAGU, G.—Continued.

total, 106 species added to Montagu's lists. *b*) references to the figures of Yarrell's 3d ed. *c*) to Hewitson's 3d ed. for eggs. *d*) references to other writings, as the *Zoologist* or the *Field* newspaper. All the editorial additions are in brackets. The editor's list of British Birds closes the volume. The page is very closely printed, in double column. Cf. *Ibis*, 1866, pp. 410-412; *Zoologist*, 2d ser., pp. 370-384, 495-497.

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1866. PRATT, J. Woodchat Shrike and Golden Oriole at Brighton. < *Zoologist*, 2d ser., i, 1866, pp. 267, 268.

1866. ROBERTS, G. [Cats as] Destroyers of Birds' Eggs. < *Zoologist*, 2d ser., i, 1866, p. 497.

1866. ROCKE, J. Ornithological Notes from Shropshire. < *Zoologist*, 2d ser., i, 1866, pp. 76-84, 161-166.

1866. RODD, E. H. The Migration of [certain British] Birds. < *Zoologist*, 2d ser., i, 1866, p. 40.

1866. RODD, E. H. Ornithological Notes from Penzance. < *Zoologist*, 2d ser., i, 1866, p. 227.

1866. ROWLEY, G. D. Nest [Parus caeruleus] within Nest [Turdus merula]. < *Zoologist*, 2d ser., i, 1866, p. 102.

1866. SAUNDERS, H. A Visit to Walney, the Lakes, and the Farne Islands. < *Zoologist*, 2d ser., i, 1866, pp. 178-188.

Narrative of a fortnight's bird's-nesting, &c.

1866. SAUNDERS, H. Alpine Swift and Buffbreasted Sandpiper in Ireland. < *Zoologist*, 2d ser., i, 1866, p. 389.

1866-67. SAXBY, H. L. Ornithological [Field] Notes from Shetland. < *Zoologist*, 2d ser., i, 1866, pp. 16-20, 61-67, 211-215, 288-293, 473-479; ii, 1867, pp. 537-539, 688-690.

Cont. from p. 9591.

1866. SMITH, A. C. *Lanius excubitor*, *Strix passerina* and *Bombycilla garrula* in Wiltshire. < *Zoologist*, 2d ser., i, 1866, pp. 227, 228.

1866. SMITH, C. List of Birds observed during a Six Weeks' Summer Visit to the Channel Islands, exclusive of Jersey. < *Zoologist*, 2d ser., i, 1866, pp. 447-453. 68 species are noticed.

1866. STEVENSON, H. Ornithological [Field] Notes from Norfolk, during October, November and December, 1865. < *Zoologist*, 2d ser., i, 1866, pp. 84-87, 260-264, 441, 442, 593-596.

1866-70. STEVENSON, H. The | Birds of Norfolk, | with | Remarks on their Habits, | Migration, | and local Distribution; | by Henry Stevenson, F. L. S., | Member of the British Ornithologists' Union. | In two volumes. | Vol. I [11]. | "Etiam si sint alia graviora et meliora, tamen | nos studia nostra naturæ regula metimur." | Cic. de Officiis Lib. I., cap. 31. | — | London: | John Van Voorst, 1, Paternoster Row, | Norwich: | Metchett and Stevenson. | 1866[1870]. 2 vols. 8vo. Vol. I, 1866, pp. i-lxxii, 1-446; Vol. II, 1870, pp. 449, not handled; Vol. III, — ?

"The extreme richness of the Ornithology of the county appears to have early attracted the notice of Norfolk naturalists, and fortunately the records of their observations are to a great extent preserved to us, though scattered amongst 'Transactions' of Learned Societies, and other publications, not always accessible to the general reader. To combine a résumé of the facts thus handed down to us, with the result of personal observations extending over several years, was the idea that first originated the present work; and there is, perhaps, no better motive for incurring the labors and doubtful honors of authorship than a desire to supply to others a want that has been personally experienced." (*Preface*.) Cf. *Ibis*, 1867, p. 238, where

1866-70. STEVENSON, H.—Continued.

the work is highly spoken of. "A most carefully elaborated work on that part of England which has probably the richest ornithology. The introduction describes at some length the general features of the county, and the changes which have been produced in its avifauna of late years, chiefly through improved agricultural practice."

Vol. I carries the subject to the end of *Gallinæ*, treating 142 spp. Vol. II continues to end of *Grallæ* only. So I suppose there is a Vol. III, which, however, I have neither seen nor heard of. Cf. *Ibis*, 1871, pp. 251, 252; *Zool.*, 2d ser., pp. 2413-2433, 2453-2464.

1866. WALTON, C. Two Letters from the late Charles Waterton, Esq., of Walton Hall. < *Zoologist*, 2d ser., i, 1866, pp. 193-196.

Desultory observations on some British Birds, &c.

1867. ANON. The Little Auk and Hen Harrier in the West of England. < *Zoologist*, 2d ser., ii, 1867, p. 637.

From the "Field", Jan. 12.

1867. ANON. Bohemian Waxwing and Bittern near Ipswich. < *Zoologist*, 2d ser., ii, 1867, p. 634.

From the "Field", Jan. 19.

1867. BARRINGTON, R. M. Arrival of Summer Visitants in County Wicklow. < *Zoologist*, 2d ser., ii, 1867, p. 754.

1867. BECKWITH, W. Firecrested Wren, Richard's Pipit and Velvet Scoter in Shropshire. < *Zoologist*, 2d ser., ii, 1867, p. 633.

1867. BLAKE-KNOX, H. Ornithological Notes from the County Dublin. From the Log of the "Gray Gull." < *Zoologist*, 2d ser., ii, 1867, pp. 678-688.

1867. BOULTON, W. W. Ornithological [Field] Notes from Beverley, East Yorkshire. < *Zoologist*, 2d ser., ii, 1867, pp. 540-546.

1867. BREE, C. R. What gives a Bird a claim to be classed as British? < *Zoologist*, 2d ser., ii, 1867, pp. 789, 790.

Answers. Editor also remarks.

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Does not say: and points out that authors disagree.

1867. BULLMORE, W. K. Cornish Fauna, a short account of all the Animals found in the County, with descriptions and remarks on the habits of many of the Rarer Birds, Fishes, &c., procured during the last six years. By W. K. Bullmore, M. D., &c. > Part I. Vertebrata. Truro. 1867. 8vo. pp. 64.

Not seen.—The ornithological portion is at pages 7-45. More than 230 species are stated to have occurred in the county. Cf. *Ibis*, 1868, pp. 99-101.

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1867. CLARK-KENNEDY, A. Curious Position of Nests [of certain British Birds]. < *Zoologist*, 2d ser., ii, 1867, pp. 951, 952.

1867. CLARK-KENNEDY, A. Ornithology of Berks and Bucks. < *Zoologist*, 2d ser., ii, 1867, p. 1014.

Notice of an intended work on.

1867. CLARK-KENNEDY, A. Dates of the Departure of Immigrants [Buckinghamshire] for 1867. < *Zoologist*, 2d ser., ii, 1867, p. 1015.

1867. CLIFTON, Lord. Savi's Warbler(?), Plover and Lesser Spotted Woodpecker in Bucks. < *Zoologist*, 2d ser., ii, 1867, p. 704.

1867. CLIFTON, Lord. Varieties of Birds [albinotic, British]. < *Zoologist*, 2d ser., ii, 1867, p. 987.

1867. CLOGG, S. Remarkable Shot [Kestrel and Blackbird]. < *Zoologist*, 2d ser., ii, 1867, p. 605.

1867. CLOGG, S. Arrival of Immigrants at Looe. < *Zoologist*, 2d ser., ii, 1867, pp. 874, 875.

1867. CORDEAUX, J. Notes on the Ornithology of the English Lakes. < *Zoologist*, 2d ser., ii, 1867, pp. 865-871.
1867. CORDEAUX, J. [Ornithological Field] Notes from Flamborough. < *Zoologist*, 2d ser., ii, 1867, pp. 1008-1011; iii, 1868, pp. 1025-1029.
1867. FEILDEN, H. W. Dates of Oviposition this Year [1867, 5 spp. of British birds]. < *Zoologist*, 2d ser., ii, 1867, p. 754.
1867. GATCOMBE, J. Woodchat Shrike, Sabine's Gull and Gullbilled Tern in the Neighbourhood of Plymouth. < *Zoologist*, 2d ser., ii, 1867, p. 557.
1867. GOATLEY, T. Little Stint [*Tringa pusilla*] and Little Gull [*Larus minutus*] at Leicester. < *Zoologist*, 2d ser., ii, 1867, pp. 991, 992.
1867. GRAY, R. Quadrupeds, Birds, and Fishes of Loch Lomond and its vicinity.
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1867. GREENWOOD, H. Double Bird's Nest [Flycatcher's on top of a Wren's]. < *Zoologist*, 2d ser., ii, 1867, p. 789.
1867. GUNN, T. E. Blue and White Varieties of British Birds' Eggs. < *Zoologist*, 2d ser., ii, 1867, pp. 754, 755.
1867. GUNN, T. E. The Snew, Green Sandpiper, &c., in Suffolk. < *Zoologist*, 2d ser., ii, 1867, p. 759.
1867. GUNN, T. E. White Varieties of [some British] Birds' Eggs. < *Zoologist*, 2d ser., ii, 1867, p. 823.
1867. GUNN, T. E. Summer Migrants, &c., near Norwich. < *Zoologist*, 2d ser., ii, 1867, pp. 873, 874.
1867. GUNN, T. E. Richard's Pipit, Shore Lark and Wood Lark in Norfolk. < *Zoologist*, 2d ser., ii, 1867, p. 634.
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1867. HARVIE-BROWN, J. A. Collected Observations on the Birds of Stirlingshire. < *Zoologist*, 2d ser., ii, 1867, pp. 884-908.
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- This is the vignette edition, limited to 150 copies 8vo, and 50 copies 4to; two of the former on vellum. It is very beautifully executed. The illustrations, excepting the coloured plate (by E. Sheppard), were drawn on stone by Frank Bott, from original designs by Wm. Sinclair. The text is simply an annotated list of the 235 spp. observed in the county: summer visitants, 42; winter visitants, 48; pass through in spring and autumn, 7; permanently resident, 94; stragglers, 44.
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1870. BELL, A. S. Avocet, Bittern and Gray Phalarope at Hastings. < *Zoologist*, 2d ser., v, 1870, pp. 2024, 2025.

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From the Humber to the Tweed.

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 Not even Echo answers.
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- 1870-71. WALKER, T. E. Bird-haunts of the Outer Hebrides. < *Zoologist*, 2d ser., v, 1870, pp. 2073-2077, 2113-2119, 2163-2171; vi, 1871, pp. 2423-2429.

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Calendar notes on birds, among other phenomena; tables of dates of migration, and also a list of dates on which certain species were known to breed in that county.

1870 or 1871. WHITE, G. (*Ed. Lady Dorer.*) The | Natural History | of | Selborne. | By the | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | Arranged for young persons. | A new edition with notes. | London: | Society for Promoting Christian Knowledge; | Sold at the Depositories: | 77, Great Queen Street, Lincoln's Inn Fields; | 4, Royal Exchange; 48, Piccadilly; | and by all Booksellers. [n. d. 1870? 1871?] 1 vol. 8vo. pp. i-x, 1-346.

Not seen: title and comment from Newton.

There is no date in the title-page, but I believe this edition appeared in 1870 or 1871. The woodcuts, mostly by Mr. Wolf, are very superior, and the foot-notes are by "T. B." (Prof. Bell). A sketch map of the district is introduced to face p. 1. Altogether it is an excellent edition and admirably meets the purpose for which it was intended.

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1871. BOYNTON, T. Goosander, Glaucous Gull and Iceland Gull in Yorkshire. < *Zoologist*, 2d ser., vi, 1871, pp. 2526, 2527.

1871. BRUNTON, J. Birds observed in the Vicinity of Glenarm. < *Zoologist*, 2d ser., vi, 1871, pp. 2698-2702.

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1871. CHALK, W. J. Gull Bunting and Longtailed Duck in Bedfordshire. < *Zoologist*, 2d ser., vi, 1871, p. 2562.

1871. CHALK, W. J. Arrival of Migrants, &c. [at Bedford.] < *Zoologist*, 2d ser., vi, 1871, p. 2638.

1871. CLIFTON, *Lord*. Buzzards, &c., at Cobham during 1870. < *Zoologist*, 2d ser., vi, 1871, pp. 2481, 2482.

1871. CLIFTON, *Lord*. Ornithological Notes from Cobham, Kent. < *Zoologist*, 2d ser., vi, 1871, pp. 2844, 2845.

1871. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., vi, 1871, pp. 2469-2472, 2495, 2496, 2594-2596, 2653-2656, 2782-2784, 2859-2861.

1871. COUCH, J. Woodcock, Wood Pigeon and Ring Onzel in Guernsey. < *Zoologist*, 2d ser., vi, 1871, p. 2870.

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Shortly annotated list of 52 spp.

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1871. GATCOMBE, J. Montagu's Harrier and Hoopoe in Devonshire. < *Zoologist*, 2d ser., vi, 1871, p. 2638.

1871. GORDON, C. Little Ank, &c., near Dover. < *Zoologist*, 2d ser., vi, 1871, p. 2443.

1871. GRAY, R. The Birds of the West of Scotland, including the Outer Hebrides, with occasional records of the occurrence of the rarer species throughout Scotland generally. By Robert Gray. Glasgow: Thomas Murray & Sons. 1871. 1 vol. 8vo. pp. 520.

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Cf. *Ibis*, 1872, p. 184.

1871. GUNN, T. E. Raptorial Birds in Norfolk. < *Zoologist*, 2d ser., vi, 1871, p. 2521.
1871. GUNN, T. E. Golden Oriole and Hoopoe near Norwich. < *Zoologist*, 2d ser., vi, 1871, p. 2849.
1871. GURNEY, J. H. Ornithological Notes from the Vicinity of Torquay during the Winter of 1870-71. < *Zoologist*, 2d ser., vi, 1871, pp. 2329-2631.
1871. GURNEY, J. H. Ornithological Notes from South Devon. < *Zoologist*, 2d ser., vi, 1871, p. 2679.
1871. GURNEY, J. H. Waterhens and Woodpigeons successively occupying the same Nest. < *Zoologist*, 2d ser., vi, 1871, pp. 2770, 2771.
1871. GURNEY, J. H. Departure of Summer Migrants from the Coast of Suffolk. < *Zoologist*, 2d ser., vi, 1871, p. 2863.
1871. GURNEY, J. H., JR. Birds at Rannoch. < *Zoologist*, 2d ser., vi, 1871, p. 2725.
1871. GURNEY, J. H., JR. Birds of the Malvern District. < *Zoologist*, 2d ser., vi, 1871, pp. 2725, 2726.
1871. GURNEY, J. H., JR. Pheasant and French Partridge. < *Zoologist*, 2d ser., vi, 1871, p. 2728.
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1871. KNIGHT, V. Nocturnal Flight of Birds at Folkestone. < *Zoologist*, 2d ser., vi, 1871, pp. 2845, 2846.
1871. LEES, E. Birds of the Malvern District, Resident, Migratory or Occasional Visitors. < *Zoologist*, 2d ser., vi, 1871, pp. 2517-2520, 2631-2637, 2659-2666.
1871. LISTER, T. Arrival of Migrants [Barnsley]. < *Zoologist*, 2d ser., vi, 1871, pp. 2763, 2764.
1871. MATHEW, M. A. British Ornithology of the Year 1870. < *Zoologist*, 2d ser., vi, 1871, pp. 2437, 2438.
Retrospective summary of rarities, etc.
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1871. MOOR, E. C. Arrival of Migrants at Great Bealings. < *Zoologist*, 2d ser., vi, 1871, p. 2865.
1871. POWER, G. E. Osprey and Rednecked Phalarope in Kent. < *Zoologist*, 2d ser., vi, 1871, p. 2847.
1871. RICHARDS, M. S. C. Purple Sandpiper, Gray Phalarope and Snow Bunting at Northam Burrows. < *Zoologist*, 2d ser., vi, 1871, pp. 2485, 2486.
1871. ROBERTS, G. A List of [17 spp. of] uncommon Birds seen or captured in Yorkshire during the Year 1870. < *Zoologist*, 2d ser., vi, 1871, p. 2604.
1871. ROBERTS, G. Miscellaneous Rural [Yorkshire] Notes for 1870. < *Zoologist*, 2d ser., vi, 1871, pp. 2673-2677, 2702-2712.
1871. ROBERTS, G. Arrival of Migrants [near Wakefield]. < *Zoologist*, 2d ser., vi, 1871, p. 2680.
1871. ROBERTS, G. Summer Migrants in Yorkshire. < *Zoologist*, 2d ser., vi, 1871, p. 2726.
1871. RODD, E. H. Notes from Scilly. < *Zoologist*, 2d ser., vi, 1871, p. 2679.

1871. [SALVIN, O.] [Notice of Stevenson's 'Birds of Norfolk.'] < *Ibis*, 3d ser., i, 1871, pp. 251, 252.
1871. SANBY, H. L. Ornithological Notes from Shetland. < *Zoologist*, 2d ser., vi, 1871, pp. 2533-2540.
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1871. SMEE, A. H. Arrival of Migrants [at Wallington Bridge]. < *Zoologist*, 2d ser., vi, 1871, pp. 2679, 2680.
1871. SMITH, C. Rednecked Grebe and Bittern in Somerset. < *Zoologist*, 2d ser., vi, 1871, p. 2563.
1871. SPENCER, T. Extraordinary Flight of Birds by Night [in England]. < *Zoologist*, 2d ser., vi, 1871, pp. 2843, 2847.
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1871. TUCK, T. G. Ornithological Notes from Aldeburgh, Suffolk. < *Zoologist*, 2d ser., vi, 1871, pp. 2804, 2805.
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- 1871-8-. YARRELL, W. (*Ed. Newton, A.*) A History of British Birds. By the late William Yarrell, V. P. L. S., F. Z. S. Fourth Edition, revised by Alfred Newton, M. A., F. R. S., etc. London: John Van Voorst. (Now publishing, in Parts of about 80 pages, to form 3 vols., 8vo, with about 600 illustrations.)
- The following are the dates of appearance of Parts thus far: Part I, June 1871, pp. 1-80; II, Aug. 1871, pp. 81-160; III, —? pp. 161-240; IV, July 1872, pp. 241-320; V, Mar. 1873, pp. 321-400; VI, July 1873, pp. 401-480; VII, Feb. 1874, pp. 481-560; VIII, Nov. 1874, pp. 561-646, ending Vol. I, with temporary title-page, note, errata, and contents, pp. i-viii.—Part IX, Feb. 1876, pp. 1-80; X, Nov. 1876, pp. 81-160; XI, Sept. 1877 (pp. 101, 102 to replace those pages in Part X), pp. 161-238; Part XII, Oct. 1878, pp. 239-318; no more seen.
- The publication of Yarrell's work began July, 1837, and ended May, 1843. A second edition appeared in 1845, and a third in 1856, but a few months before the author's death. The 2d and 3d were substantially reprints of the first, though with some additions and alterations. During the thirty years the literature of the subject nearly doubled, and there was a great increase in the knowledge of the subject after the third edition appeared. A new edition was demanded, not only by the public at large but by those who held the earlier issues; and it was the heaviest task of the editor of the fourth to sift the enormous mass of new material at his service. The editor did not scruple to make such systematic changes as he considered necessary, nor to scrutinize closely the claim of any bird to be considered British. The scientific names were retained, as given by Yarrell; but the editor also prefixed names according, as far as possible, to the Rules adopted by the British Association, hoping thus to ultimately reach a more uniform nomenclature. The third edition was embellished with 550 woodcuts; the present is to contain nearly 600.
- The editor has thus far executed his self-imposed task with the utmost care, fidelity, and success; but of a work thus in process of publication a full notice must be deferred.
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Regrets even qualified approval of the proposal for including their productions in the British Fauna.

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With his idea of the imaginary 'British' boundary.
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1872. CORDEAUX, J. Ornithological Notes from North Lincolnshire [cont. from Zool., s. s., 2861]. < *Zoologist*, 2d ser., vii, 1872, pp. 2928-2932, 3014-3016, 3095-3098, 3165, 3166, 3320-3323.
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1874. HANCOCK, J. A Catalogue [of] The Birds [of] Northumberland and Durham. [By John Hancock, [with fourteen Photographic copper-plates from] drawings by the author.] London: 1874. 8vo. = Vol. VI (for 1873) of the *Nat. Hist. Trans. Northumb. and Durh.*, pp. i-xxvi, 1-174, with 2 ll. app. and err., 14 pll.
Spp. circ. 265, an addition of over 50 spp. to the principal previous list (Selby's, 1831, *q. v.*). 90 residents (breeding or not); 40 spring-and-autumn migrants (breeders); 54 autumn-and-winter visitants; 79 casual visitants; *Accip.* 26, *Puss.* 102, *Columb.* 4, *Gall.* 7, *Grall.* 50, *Palmip.* 76. Replete with local items and biographical matter. The introduction notices previous publications on the subject, and treats very fully of the character of the region and its Ornis in general; special exposition of and protest against wanton destruction of birds. The classification of Degland-Gerbe is followed. The author's ripe experience and great care result in a work meeting all the requirements of a local treatise, which at once becomes the standard authority on the subject.
1874. HODGKINSON, J. B. Glossy Ibis and Roller [in Great Britain]. < *Zoologist*, 2d ser., ix, 1874, p. 4158.

1874. HÜGEL, A. V. Ornithological Notes from Torquay. < *Zoologist*, 2d ser., ix, 1874, pp. 3903-3909, 4065, 4066.
1874. JEFFERY, W., JR. Ornithological Notes from West Sussex. < *Zoologist*, 2d ser., ix, 1874, pp. 3822-3824.
1874. KERR, W. J. Ornithological Notes from Denbighshire. < *Zoologist*, 2d ser., ix, 1874, p. 3913.
1874. LISTER, T. On Birds observed in the West Riding of Yorkshire in former and recent years. < *Rep. Brit. Ass. Adv. Sci. for 1873*, xliii, 1874 (*Misc. Comm.*), pp. 116-118.
Number of species observed in each family, only a few of the rarest being mentioned by name, with brief annotation, followed by a discussion of the comparative numbers in different groups.
1874. MATHEW, G. F. Ornithological Notes from North Devon. < *Zoologist*, 2d ser., ix, 1874, pp. 4131-4135.
1874. MATHEW, G. F. Ornithological Notes from Dartmouth. < *Zoologist*, 2d ser., ix, 1874, p. 4230.
1874. MATHEW, G. F. Ornithological Notes from North Devon. < *Zoologist*, 2d ser., ix, 1874, pp. 4249, 4253.
1874. MATHEW, M. A. Bird Notes from the West. < *Zoologist*, 2d ser., ix, 1874, pp. 3824-3826.
1874. MANSEL-PLEYDELL, J. C. Ornithology. < *Hutchins's Hist. and Antiq. of Dorset*, 3d edit., folio, Shipp and Hodson, Westminster: Part XV, 1874, General Introduction (recommended to be bound in Vol. I. though signated IV), pp. cxv-cxxx.
This is a considerable list, with short miscellaneous notices of each species. It is entirely remodeled from the old Pulteney list, to which reference is made. The author had the co-operation of several accomplished ornithologists in revising the nomenclature, and appears to have brought the subject fully up to date in all the requirements of a local list.
I have handled the work as issued in Parts, but have been unable to compare it with the prior editions.
1874. MANSEL-PLEYDELL, J. C. Ornithology and Conchology of the County of Dorset. By John Clavell Mansel-Pleydell, B. A., F. L. S., F. G. S. London and Blandford. 1874. 1 vol. 8vo. pp. 320.
Not seen.—Said to be a separate imprint from the new edition of Pulteney's Dorsetshire, in course of publication at the time. With reference to this work, it is added that a complete account of the birds of Dorsetshire remains to be written. Cf. *Ibis*, 1874, pp. 447, 448.
1874. MEMBERS OF THE BELFAST NATURALISTS' FIELD CLUB. Guide to Belfast | and the | adjacent Counties | by Members of | the Belfast Naturalists' Field Club | [Arms.] | Belfast: | published for the Club by | Marcus Ward & Co., Royal Ulster Works | 1874 | [All rights reserved.] | 1 vol. pp. 1-328, pl. 46, frontisp., map.
Aves, pp. 95-104. Rare birds—*Raptores*, *Insessores*, *Rasores*, *Grallatores*, *Natatores*—summary notices of.
1874. RODD, E. H. Spring Migrants [at Penzance]. < *Zoologist*, 2d ser., ix, 1874, p. 3997.
1874. ROPE, G. T. Notes from Leiston, Suffolk. < *Zoologist*, 2d ser., ix, 1874, pp. 3865-3868.
1874. ROWLEY, G. D. Short-toed Lark and other Birds at Brighton. < *Zoologist*, 2d ser., ix, 1874, pp. 3832.
1874. SAXBY, L. H. Ornithological Query. < *Zoologist*, 2d ser., ix, 1874, pp. 4116, 4117.
Should be referred to a life insurance company.

1874. SAXBY, H. L. The Birds of Shetland, with Observations on their Habits, Migration and occasional appearance. By the late Henry L. Saxby, M. D. Edited by his brother, Stephen H. Saxby, M. A. Edinburgh. 1874. 8vo. pp. 398.
Not seen.—“The chief excellence of Dr. Saxby’s book consists in its field-notes, which bear the stamp of having been written almost out of doors.” The list appended by the editor gives 202 spp., nearly a third of which were added by the author; but several are said to be included on doubtful evidence. Cf. *Ibis*, 1874, pp. 448, 449.
1874. SCLATER, J. Notes from Castle Eden. < *Zoologist*, 2d ser., ix, 1874, pp. 4066-4070, 4221-4223.
1874. SCLATER, P. L. [Notice of Mr. C. Kennedy’s proposed work on the natural history of the Orkneys.] < *Ibis*, 3d ser., iv, 1874, p. 186.
1874. SMITH, C. Ornithological Notes from Somersetshire. < *Zoologist*, 2d ser., ix, 1874, pp. 3868-3872.
1874. STEVENSON, H. Ornithological Notes from Norfolk. < *Zoologist*, 2d ser., ix, 1874, pp. 3859-3865, 4185-4191.
1874. TUCK, J. G. Birds in Cambridge Market. < *Zoologist*, 2d ser., ix, 1874, p. 4116.
1874. THOMAS, W. Yellow Wagtail and Wild Goose near Guildford. < *Zoologist*, 2d ser., ix, 1874, p. 4118.
1874. WHITAKER, J. Arrival of Spring Birds in Nottinghamshire. < *Zoologist*, 2d ser., ix, 1874, p. 4196.
1874. WHITAKER, J. Chiffchaff, Swift and Fieldfare [at Calverton]. < *Zoologist*, 2d ser., ix, 1874, p. 4197.
1875. ANON. Exportation of [British] Birds to New Zealand. < *Zoologist*, 2d ser., x, Feb., 1875, pp. 4335, 4336.
From *Daily News*, Jan. 11, 1875.
1875. ANON. Migratory Birds at Port Said. < *Zoologist*, 2d ser., x, Nov., 1875, pp. 4689, 4690.
1875. ATKINSON, J. C. Moorhen and Snipe feeding on Bread. < *Zoologist*, 2d ser., x, May, 1875, p. 4457.
1875. BELL, T. Unpublished Letter of the Rev. Gilbert White. < *Zoologist*, 2d ser., x, May, 1875, p. 4447.
To Pennant, dated Selborne, Sept. 1, 1769, on the establishment of a periodical devoted to Natural History.
1875. BUTLER, A. G. Notes on Birdsnesting in Kent. < *Zoologist*, 2d ser., x, Aug., 1875, pp. 4565-4567.
1875. BUTTERFIELD, E. Golden Oriole [*Oriolus galbula*] and Hoopoe [*Upupa epops*] near Bradford. < *Zoologist*, 2d ser., x, Sept., 1875, p. 4323.
1875. BUTTERFIELD, E. White Sand Martin and Blackbird. < *Zoologist*, 2d ser., x, Sept., 1875, p. 4625.
1875. CORBIN, G. B. Swallows and Martins and Fieldfares. < *Zoologist*, 2d ser., x, Feb., 1875, p. 4338.
The lateness of their stay in 1874.
1875. CORBIN, G. B. Siskin, Lesser Redpoll, &c., near Ringwood. < *Zoologist*, 2d ser., x, Mar., 1875, p. 4382.
1875. CORBIN, G. B. Fieldfares versus Missel Thrushes and Starlings. < *Zoologist*, 2d ser., x, Nov., 1875, pp. 4692, 4693.
1875. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., x, Jan., 1875, pp. 4294-4296.
Notes for Sept.-Nov., 1874, continued from p. 4226.
1875. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., x, Mar., 1875, pp. 4361-4366.
Continued from p. 4366.

1875. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., x, June, 1875, pp. 4488-4490.
Continued from p. 4366.
1875. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., x, Sept., 1875, pp. 4617, 4618.
1875. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., x, Nov., 1875, pp. 4669, 4670.
1875. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., x, Dec., 1875, pp. 4709, 4710.
1875. COUCH, J. Rare Birds in Guernsey. < *Zoologist*, 2d ser., x, Jan., 1875, p. 4296.
1875. COUCH, J. Rare Birds in Guernsey. < *Zoologist*, 2d ser., x, Mar., 1875, pp. 4379, 4380.
1875. DOUBLEDAY, H. Critical Notices (accompanied by the passages criticised) of a work entitled "A Catalogue of the Birds of Northumberland and Durham, by John Hancock." < *Zoologist*, 2d ser., x, May, 1875, pp. 4429-4438.
1875. D'URBAN, H. S. M. Handbook of Devonshire, South Devon, Dartmoor, Torquay, Teignmouth, Dawlish, Newton, Ashburton, Kingsbridge, Moreton, Chagford, with a Sketch of the Natural History. By Henry S. M. D'Urban. Exeter. Henry Beesley & Son. 1875.
Not seen. Said to give lists of the rarer and more interesting Mammals, Birds, &c. Cf. *Zoologist*, 2d ser., x, 1875, p. 4628.
1875. GATCOMBE, J. Ornithological Notes from Devonshire, Cornwall, &c. < *Zoologist*, 2d ser., x, March, 1875, pp. 4370-4373; May, 1875, pp. 4448-4451; June, 1875, pp. 4490, 4491; Aug., 1875, pp. 4568, 4569; Oct., 1875, pp. 4635, 4636.
1875. GATCOMBE, J. Ornithological Notes from Somersetshire during September, 1875. < *Zoologist*, 2d ser., x, Nov., 1875, pp. 4671, 4672.
1875. GATCOMBE, J. Ornithological Notes from Somersetshire and Devonshire. < *Zoologist*, 2d ser., x, Dec., 1875, pp. 4716-4719.
1875. GILLAH, G. Stock Dove in a Magpie's Nest. < *Zoologist*, 2d ser., x, July, 1875, pp. 4539, 4540.
1875. GURNEY, J. H. Redwing killed by a Crow. < *Zoologist*, 2d ser., x, March, 1875, p. 4381.
1875. GURNEY, J. H., JR. Pomatorhine Skuas and Black Guillemots at Flamborough. < *Zoologist*, 2d ser., x, Oct., 1875, p. 4667.
1875. GUNX, T. E. Wild Fowl in Norfolk. < *Zoologist*, 2d ser., x, Feb., 1875, p. 4337.
1875. GUNX, T. E. Starvation of Kingfishers, &c. < *Zoologist*, 2d ser., x, Feb., 1875, p. 4338.
1875. HADFIELD, H. Spring Migrants [in the Isle of Wight]. < *Zoologist*, 2d ser., x, June, 1875, p. 4495.
1875. HADFIELD, H. Spring Migrants [in the Isle of Wight]. < *Zoologist*, 2d ser., x, July, 1875, p. 4537. See p. 4623.
1875. HADFIELD, H. On the Migration of [certain British] Birds. < *Zoologist*, 2d ser., x, Dec., 1875, pp. 4711-4713.
1875. HAMEL, E. D. Cuckoos Congregating: Pigeons laying in a Magpie's Nest. < *Zoologist*, 2d ser., x, Aug., 1875, p. 4573.
1875. HARTING, J. E. Our Summer Migrants. | An account of | the Migratory Birds | which pass the summer in | the British Islands. | By J[ames]. E[dmund]. Harting, F. L. S., F. Z. S. | author of [etc., 3 lines.] | Illustrated from designs by Thomas Bewick. | [Design.] | London: | Bickers and Son, | 1, Leicester Square. | 1875. 1 vol. 8vo. pp. i-x, 1-336.

"In the following chapters an attempt has been made to answer these questions [respecting migration] and to give such information generally about our summer migratory birds as will

1875. HARTING, J. E.—Continued.

prove acceptable to many who may be glad to possess it without knowing exactly where to look for it. Some of these sketches were originally published in the Natural History columns of "The Field" during the summer of 1871, and as a reprint has frequently been asked for, I have now carefully revised them and made some important additions and emendations, besides adding to the series a dozen or more chapters which have never before appeared." (Extr. from Preface.)

About fifty species are treated in the author's usual agreeable style. The cuts, though not without a certain brilliancy, cannot be highly commended as finely finished reproductions of Bewick.

1875. MATHEW, G. F. Ornithological Notes from Dartmouth. < *Zoologist*, 2d ser., x, Feb., 1875, pp. 4325-4329.

Oct.-Dec., 1874.

1875. MATHEW, M. A. The Somersetshire Moors in the Spring. < *Zoologist*, 2d ser., x, July, 1875, pp. 4532, 4533.

With reference to the birds seen there and then.

1875. MATHEW, M. A. Rare Birds in North Devon. < *Zoologist*, 2d ser., x, Dec., 1875, p. 4720.

1875. NEWMAN, E. The Birds of Shetland, with Observations on their Habits, Migration and Occasional Appearance, . . . < *Zoologist*, 2d ser., x, Jan., 1875, pp. 4269-4289.

Third and concluding notice of H. L. Saxby's work of that name.

1875. PALMER, J. E. Birds observed near Huddersfield. < *Zoologist*, 2d ser., x, Mar., 1875, p. 4379.

Notes on 6 spp.

1875. PIKE, W. Migration of [certain British] Birds. < *Zoologist*, 2d ser., x, June, 1875, p. 4494.

1875. PIKE, W. Climate and Ornithology of Achill. < *Zoologist*, 2d ser., x, July, 1875, pp. 4534-4536.

1875. PILLY, J. B. Hobby and Egyptian Goose near Hereford. < *Zoologist*, 2d ser., x, Mar., 1875, p. 4381.

1875. RICKARDS, M. S. C. Hobby at Portishead and Goldeneye near Axbridge. < *Zoologist*, 2d ser., x, Jan., 1875, p. 4297.

1875. RODD, E. H. Spring Migration at the Land's End District. < *Zoologist*, 2d ser., x, June, 1875, pp. 4494, 4495.

1875-76. [ROWLEY, G. D.] British Birds. < *Rowley's Orn. Misc.*, Pt. ii, Aug. 1875, pp. 49-134, pll. x-xv; Part iii, Jan. 1876, pp. 135-140.

This is a series of pleasantly written articles on various Birds of Great Britain, accompanied by some excellent plates. The species are too many (upwards of 40) and the matter too miscellaneous to be here characterized. The plates are: pl. x, *Accipiter nisus*; xi, *Aluco flammeus*; xiii^a, xiii^b, xiii^c, *Anas boschas*, *Carduelis elegans*, etc., and other birds, to show variation in throat plumage; xii, a lens glass; xiv, xv, Scenery.

1875. SCLATER, J. [Ornithological] Notes from Castle Eden. < *Zoologist*, 2d ser., x, Feb., 1875, pp. 4329-4332; Apr., 1875, pp. 4401-4406.

1875. SMEE, A. H. Notes of a Cruise at the Mouths of the Thames and Blackwater Rivers. < *Zoologist*, 2d ser., x, May, 1875, pp. 4451, 4452.

Notes on various birds observed.

1875. SMEE, A. H. Migration of Waders [in England]. < *Zoologist*, 2d ser., x, Oct., 1875, p. 4663.

1875. SMITH, CECIL. Ornithological Notes from Somersetshire. < *Zoologist*, 2d ser., x, Feb., 1875, pp. 4332-4335.

1875. SMITH, CECIL. Albino and other Variations of Plumage in [certain British] Birds. < *Zoologist*, 2d ser., x, Apr., 1875, pp. 4422-4424.

1875. SOUTHALL, W. Birds in my Garden [at Birmingham]. < *Zoologist*, 2d ser., x, July, 1875, pp. 4533, 4534.

1875. STEVENSON, H. Ornithological Notes from Norfolk. < *Zoologist*, 2d ser., x, Jan., 1875, pp. 4289-4294; Mar., 1875, pp. 4366-4370; Sept., 1875, pp. 4629-4635.
Notes continued from p. 4191.
1875. TUCK, J. G. [Ornithological] Notes from Aldeburgh, Suffolk. < *Zoologist*, 2d ser., x, July, 1875, pp. 4536, 4537.
1875. TUCK, J. G. Rare Birds at Flamborough. < *Zoologist*, 2d ser., x, Nov., 1875, p. 4689.
1875. WHITAKER, J. Arrival of Spring Birds in Nottinghamshire. < *Zoologist*, 2d ser., x, July, 1875, p. 4537.
1875. WHITE, G. (*Ed. Harting, from Bennett.*) The Natural History | and | Antiquities | of | Selborne, | in the county of Southampton. | By the Rev. Gilbert White, M. A. | The standard edition by E. T. Bennett. | Thoroughly revised, with additional Notes. | By James Edmund Harting, F. L. S., F. Z. S. | Author of "A Handbook of British Birds," "The | Ornithology of Shakespeare," etc. | Illustrated with Engravings by Thomas Bewick, | Harvey, and others. | London: Bickers and Son, 1, Leicester Square, 1875. 1 vol. 8vo. pp. i-xxii, 1-532.
Not seen: title from Newton, 1877. The engravings ascribed to Bewick in the title-page may easily be seen, on comparison, to be copies of his masterpieces, and not printed from the blocks which illustrate his well-known *British Birds*. The edition is otherwise very well "got up." The editor has freely altered such of his predecessor's notes as seemed to require amendment, and of course many did. To face p. 385 is inserted a *fac-simile* copy of the same page of the author's diary as had been given forty years before by Jesse, in his *Gleanings in Natural History*. (Cf. 1834.)
1875. WHITE, G. (*Ed. Buckland.*) Natural History | and | Antiquities of Selborne | by | Gilbert White | with notes, by | Frank Buckland. | A chapter on Antiquities, by | Lord Selborne. | And new letters. | Illustrated by P. H. Delamotte. | London: | Macmillan and Co. | 1875. 1 vol. 8vo. pp. i-xxx, 1-591.
Not seen—title and comment from Newton.
In this edition the author's "Natural History" ends with p. 292, to which follow the comparative "Calendar" kept by White and Markwick, and then Mr. Buckland's notes, extending over pp. 309-458. The author's "Antiquities" occupy pp. 459-555, and on p. 559 begins Lord Selborne's "Appendix," which ends at p. 574. The volume is profusely illustrated by woodcuts; but, except the views of the place and its neighborhood, few of them have anything especially to do with White or Selborne. The same may be said of the editor's "Notes"; and the "Memoir" gives little information about the author that was not known before. As a whole, the edition has served to amuse the general reader, but can never be deemed by a naturalist to be worthy of the author's memory, Lord Selborne's contribution excepted. The new letters (five in number, lent by Mr. J. W. Edgehill, of Culter, Aberdeen) bear date from November, 1774, to January, 1791, and are addressed to the writer's nephew Samuel Barker, his sister Mrs. Barker, his niece Anne Barker (2), and his brother-in-law Thomas Barker. To the first is prefixed a poetical "Invitation to Selborne," which consists of a great part of the poem "Selborne," afterwards printed with amplifications, combined with some lines subsequently incorporated with the well-known "Naturalist's Summer Evening Walk." One of the letters to Anne Barker, dated February 5, 1785, is nearly identical with the already published sixty-third letter to Barrington. To face p. xxii is a photograph of a portion of the letter there printed, and on p. 473 is a woodcut representing in *fac-simile* the last entry in the burial register of Selborne, signed by White as "Curate," June 10, 1793, followed by the certificate of his own burial, July 1, 1793, signed "Ch. Taylor—Vicar."
1875. WHITE, G. (*Ed. Buckland.*) The Natural History and Antiquities of Selborne. By Gilbert White, with notes by Frank Buckland; A Chapter on Antiquities by Lord Selborne; and New Letters. Illustrated by P. H. Delamotte. New York: Macmillan. 1875. 8vo.
American reissue of London ed. of same date. Cf. *The Nation*, No. 565, April 27, 1875, p. 283.
1875. WRIGLEY, J. W. Richardson's Skua and Storm Petrel at Formby, Lancashire. < *Zoologist*, 2d ser., x, Jan., 1875, p. 4300.
1876. BENSON, C. W. Sparrowhawk and Missel Thrush. < *Zoologist*, 2d ser., xi, July, 1876, pp. 5000, 5001.
1876. BOYES, F. A few Rough Notes from Beverley for the Close of the Year 1875. < *Zoologist*, 2d ser., xi, Apr., 1876, pp. 4861-4863.

1876. BOYES, F. Sea Birds at Bridlington. < *Zoologist*, 2d ser., xi, Oct., 1876, p. 5116.
1876. BOYES, F. The Time of Day at which Birds lay their Eggs. < *Zoologist*, 2d ser., xi, Oct., 1876, pp. 5115, 5116.
1876. CLIFTON, Lord. Wood Wren and Greenshank in Sutherland. < *Zoologist*, 2d ser., xi, Oct., 1876, p. 5122.
1876. CLOGG, S. Migration of Birds [in England]. < *Zoologist*, 2d ser., xi, Jan., 1876, pp. 4757, 4758.
1876. CORBIN, G. B. Small Birds and Reed Beds. < *Zoologist*, 2d ser., xi, Mar., 1876, pp. 4827, 4828.
1876. CORBIN, G. B. Rare Birds near Ringwood during the Winter of 1875-76. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4939-4991.
1876. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., xi, Feb., 1876, pp. 4778-4780.
Continued from p. 4710.
1876. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4897-4899.
1876. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4932-4935.
1876. CORDEAUX, J. Ornithological Notes from North Lincolnshire. < *Zoologist*, 2d ser., xi, Sept., 1876, pp. 5031, 5032.
1876. DOUGLAS-OGILBY, J. Notes from Portrush, County Antrim. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4903-4905.
1876. DOUGLAS-OGILBY, J. Arrival of Spring Migrants in County Dublin. < *Zoologist*, 2d ser., xi, July, 1876, p. 4993.
1876. DURNFORD, W. A. Ornithological Notes from the North-West Coast. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4903-4910.
1876. EDSON, G. Rare Birds near Malton. < *Zoologist*, 2d ser., xi, May, 1876, p. 4919.
1876. EEDLE, T. Peregrine Falcon, Great Northern Diver and Wild Geese near Merton Hall, Norfolk. < *Zoologist*, 2d ser., xi, Jan., 1876, p. 4760.
1876. ELLIOTT, A. C. Rare Birds in Lincolnshire. < *Zoologist*, 2d ser., xi, Feb., 1876, p. 4794.
1876. GATCOMBE, J. Ornithological Notes from Devonshire and Cornwall. < *Zoologist*, 2d ser., xi, Feb., 1876, pp. 4783-4785.
Continued from p. 4636.
1876. GATCOMBE, J. Ornithological Notes from Devonshire and Cornwall. < *Zoologist*, 2d ser., xi, Mar., 1876, pp. 4823, 4824.
1876. GATCOMBE, J. Ornithological Notes from Devonshire and Cornwall. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4901-4903.
1876. GATCOMBE, J. Ornithological Notes from Devon and Cornwall. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4991-4993.
1876. GATCOMBE, J. Ornithological Notes from Devon and Cornwall. < *Zoologist*, 2d ser., xi, Aug., 1876, pp. 5028-5030.
1876. GATCOMBE, J. Ornithological Notes from Devon and Cornwall. < *Zoologist*, 2d ser., xi, Oct., pp. 5109, 5110.
1876. GATCOMBE, J. Ornithological Notes from Cornwall, Devon, and Somersetshire. < *Zoologist*, 2d ser., xi, Nov., 1876, pp. 5145-5147.
1876. GATCOMBE, J. Chough, Curlew Sandpiper and Little Stint at Portrush. < *Zoologist*, 2d ser., xi, Nov., 1876, p. 5165.
1876. GRIPPER, J. E. Rare Birds and Otter near York. < *Zoologist*, 2d ser., xi, 1876, p. 4919.

1876. GUNN, T. E. Notes on the Occurrence of Rare Birds in Norfolk and Suffolk. < *Zoologist*, 2d ser., xi, Feb., 1876, pp. 4785-4791.
1876. GURNEY, J. H., JR. Avocet and Pectoral Sandpiper in Durham. < *Zoologist*, 2d ser., xi, Jan., 1876, p. 4765.
1876. GURNEY, J. H., JR. Ducks and Partridges laying in the same Nest. < *Zoologist*, 2d ser., xi, Jan., 1876, pp. 4765, 4766.
1876. GURNEY, J. H., JR. 'A Catalogue of the Birds of Northumberland and Durham', by John Hancock. < *Zoologist*, 2d ser., xi, Feb., 1876, p. 4793.
Remarks on Doubleday's (p. 4429) notice of the work.
1876. GURNEY, J. H., JR. Addendum to a Note on Rare Sea Birds (*Zool. S. S.* 1295). < *Zoologist*, 2d ser., xi, Feb., 1876, p. 4794.
1876. GURNEY, J. H., JR. Sparrowhawk and Woodcock. < *Zoologist*, 2d ser., xi, Apr., 1876, p. 4870.
1876. GURNEY, J. H., JR. Leadenhall Market in May. < *Zoologist*, 2d ser., xi, June, 1876, p. 4953.
1876. GURNEY, J. H., JR. The Farne Islands. < *Zoologist*, 2d ser., xi, July, 1876, p. 4999.
1876. GURNEY, J. H., JR. The Museum at York. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4999, 5000.
The Strickland Collection.
1876. GURNEY, J. H., JR. Nidification of the Pied Wagtail and Swallow. < *Zoologist*, 2d ser., xi, July, 1876, p. 5003.
1876. GURNEY, J. H., JR. Errata in Mr. Harting's 'Handbook of British Birds'. < *Zoologist*, 2d ser., xi, Aug., 1876, p. 5041.
1876. GURNEY, J. H., JR. Ornithological Notes from Blakeney. < *Zoologist*, 2d ser., xi, Sept., 1876, pp. 5078, 5079.
1876. HADFIELD, H. Arrival of Spring Migrants, Nesting of the House Sparrow, &c. < *Zoologist*, 2d ser., xi, July, 1876, p. 4997.
1876. HADFIELD, H. Bird Notes from the Isle of Wight. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4997, 4998.
1876. HADFIELD, H. Ornithological Notes from the Isle of Wight. < *Zoologist*, 2d ser., xi, Nov., 1876, p. 5160.
1876. HENSON, C. W. Ornithological Notes from Dublin. < *Zoologist*, 2d ser., xi, May, 1876, p. 4919.
1876. JEFFERY, W. Notes from West Sussex. < *Zoologist*, 2d ser., xi, Apr., 1876, pp. 4863-4865.
1876. J. T. C. Transactions of the Norfolk and Norwich Naturalists' Society. 1875-6. Vol. II., Part 2. Norwich: Fletcher & Son. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4974-4982.
A digest of the Part of the Transactions named, the ornithological matter here commented upon relating chiefly to British Birds. The most interesting part of the article has reference to ten before unpublished letters of Gilbert White, addressed to Robert Marsham.
1876. KERRY, F. Rare Birds in Essex. < *Zoologist*, 2d ser., xi, Mar., 1876, p. 4827.
1876. MARSHAM, H. P., and BELL, Prof. The Correspondence [of] Robert Marsham of Stratton Strawless in the County [of] Norfolk, Esquire, and Fellow of the Royal Society; [and] the Reverend Gilbert White, of Selborne, in the County [of] Southampton, Master of Arts, and Fellow of Oriel College [in the University of Oxford. 1790-1793. Communicated by the Rev. H. P. Marsham, and Prof. Bell, September 28th, 1875, and March 1st, 1876 (*Transactions of the Norfolk and Norwich Naturalists' Society*, vol. ii, pp. 133-195).

Not seen—title and comment from Newton.

[Cf. "Notes and Queries," 5th ser., vi, 280.] Ten hitherto unpublished letters are here printed from the originals in Mr. H. P. Marsham's possession. Two more of the series (dated, as appears from his correspondent's replies, Oct. 12, 1790, and June 8, 1791) are missing. The "Introductory Note" is signed "T. S." (Southwell), and foot-notes are added by "J. E. H." (Harting) and "A. N." (Alfred Newton).

1876. MATHEW, M. A. Notes from North Devon and West Somerset. < *Zoologist*, 2d ser., xi, Mar., 1876, pp. 4813-4815.
1876. MATHEW, M. A. Notes from West Somerset. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4899-4901.
1876. MATHEW, M. A. Notes from West Somerset. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4995, 4996.
1876. MATHEW, M. A. Notes on the Cuckoo and Redbacked Shrike. < *Zoologist*, 2d ser., xi, Aug., 1876, p. 5045.
1876. MATHEW, M. A. The Exeter Albert Memorial Museum. < *Zoologist*, 2d ser., xi, Oct., 1876, p. 5115.
1876. MATHEW, G. F. Scarce Birds at Torquay. < *Zoologist*, 2d ser., xi, Nov., 1876, p. 5161.
1876. [NEWMAN, E.] A History of British Birds, by the late William Yarrell. . . . < *Zoologist*, 2d ser., xi, June, 1876, p. 4969.
Notice of Part ix of Newton's ed. of the work.
1876. [NEWMAN, E.] Our Summer Migrants: an Account of the Migratory Birds which pass the Summer in the British Islands. By J. E. Harting. . . . < *Zoologist*, 2d ser., xi, June, 1876, p. 4970.
Notice of the work.
1876. NICHOLLS, H. Bewick's Swan and other Birds at Kingsbridge, Devon. < *Zoologist*, 2d ser., xi, Dec., 1876, p. 5180.
1876. PRIOR, C. M. Tree Sparrow and Wood Pigeon building in a Magpie's Nest. < *Zoologist*, 2d ser., xi, Apr., 1876, p. 4875.
1876. RODD, E. H. Dartford Warbler, Green Woodpecker and Starling at the Land's End. < *Zoologist*, 2d ser., xi, Feb., 1876, p. 4796.
1876. RODD, E. H. Our Summer Migrants, in Cornwall. < *Zoologist*, 2d ser., xi, Aug., 1876, pp. 5039, 5040.
1876. RODD, E. H. Solitary Snipe, Hoopoe, and Leach's Petrel in Cornwall. < *Zoologist*, 2d ser., xi, Nov., 1876, p. 5167.
1876. SANBY, S. H. The Time of Day at which Birds lay their Eggs. < *Zoologist*, 2d ser., xi, Nov., 1876, p. 5161.
1876. SCLATER, J. Notes from Castle Eden. < *Zoologist*, 2d ser., xi, Jan. 1876, pp. 4746-4750.
Continued from p. 4406. Entirely ornithological.
1876. SCLATER, J. Notes from Castle Eden. < *Zoologist*, 2d ser., xi, Mar., 1876, pp. 4815-4819.
1876. SCLATER, J. Notes from Castle Eden. < *Zoologist*, 2d ser., xi, April, 1876, pp. 4858-4860.
1876. SCLATER, J. Notes from Castle Eden. < *Zoologist*, 2d ser., xi, July, 1876, pp. 4985-4989.
1876. SCLATER, J. Notes from Castle Eden. < *Zoologist*, 2d ser., xi, Oct., 1876, pp. 5103-5105.
1876. SMITH, CECIL. A few Ornithological Notes from Guernsey. < *Zoologist*, 2d ser., xi, Feb., 1876, pp. 4780-4783.
1876. SMITH, CECIL. A few Ornithological Notes from Guernsey and some of the other Channel Islands, from the 3rd to the 19th of June, 1876. < *Zoologist*, 2d ser., xi, Aug., 1876, pp. 5024-5028.
1876. SMITH, H. ECROYD. A First Peep at the Bird-breeders on old Farne. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4933-4936.
1876. STEVENSON, H. Ornithological Notes from Norfolk. < *Zoologist*, 2d ser., xi, Feb., 1876, pp. 4773-4778. May, 1876, pp. 4893-4897.
Continued from p. 4635.

1876. STEVENSON, H. Ornithological Notes from Norfolk. < *Zoologist*, 2d ser., xi, May, 1876, pp. 4893-4897.
1876. STEVENSON, H. Ornithological Notes from Norfolk. < *Zoologist*, 2d ser., xi, Oct., 1876, pp. 5105-5103.
1876. STEVENSON, H. Redstarts and Blue Tits nesting in Human Skulls. < *Zoologist*, 2d ser., xi, Oct., 1876, pp. 5116, 5117.
1876. TUCK, J. G. Sea Birds at Flamborough. < *Zoologist*, 2d ser., xi, Jan., 1876, pp. 4758, 4759.
1876. TUCK, J. G. Notes from Flamborough, &c. < *Zoologist*, 2d ser., xi, Aug., 1876, p. 5040.
1876. WALLIS, H. M. Ornithological Notes. < *Zoologist*, 2d ser., xi, Aug., 1876, pp. 5030-5032.
On *Alca torda*, *Fratercula arctica*, *Uria grylle*, *Tringoides hypoleucus*.
1876. WHITAKER, J. Birds near Rainworth. < *Zoologist*, 2d ser., xi, Apr., 1876, p. 4869.
1876. WHITAKER, J. Ornithological Notes from Perthshire. < *Zoologist*, 2d ser., xi, Oct., 1876, pp. 5100-5103.
1876. WHITE, G. [Correspondence with R. Marsham.]
See MARSHAM, H. P., 1876.
1876. WHITE, G. (*Ed. Harting, from Bennett.*) The Natural History and Antiquities of Selborne. . . . London, 1876.
This is the Harting ed. of 1875, reissued as a new edition, with the addition of the letters of White to Marsham (*cf.* Marsham, 1876).
1877. ANON. Scarcity of Spring Birds [in England]. < *The Country*, i, Nov. 17, 1877, p. 43.
1877. GURNEY, J. H., JR. On Flamborough Head. < *Rowl. Orn. Misc.*, iii, pt. xi, Nov., 1877, pp. 29-38.
Notes on the habits of the birds of that place.
1877. NEWTON, A. The published Writings of Gilbert White. (Nat. July 18, 1720; ob. June 26, 1793.) < *Notes and Queries*, 5th ser., vii, Mar. 31, 1877, pp. 241-243; Apr. 7, 1877, pp. 234, 235.
This is an admirable piece of bibliography, by one from his boyhood a diligent disciple of White, and for many years a careful collector of the different editions of his principal work; it gives a far more complete list of his writings than had before appeared. It was originally prepared, the writer states, for Dr. Elliott Cones; and has been mainly relied upon in the present bibliography.
Chiefly according to this authority the editions of White's "Selborne" are as follows:
1789. PRINCERS edition. 1 vol. 4to. London. T. Bensley for B. White and Sons. pp. vi, 468, 7 ll., 7 pll., besides one on p. 307.
1792. MEYER edition (German translation, modified). 1 vol. 16mo. Berlin. H. A. Rottmann. pp. viii, 168.
- ?1793. (*Cf.* Ag. and Strickl. Bibl. iv, p. 560, "probably in error.") [See ante, p. 368.]
1795. AIKEN edition of the "Calendar" only. 1 vol. 8vo. London. B. & J. White. pp. 176.
1802. MARKWICK edition. 2 vols. 8vo. London. For J. White by T. Bensley. i, pp. viii, 392, pll. 2; ii, pp. 320, pll. 2.
1813. *The same*. 2 vols. 8vo (some in 4to?). London. For White, Cochrane & Co., etc. i, pp. viii, 352, pll. 3; ii, pp. 364.
- ?1822. (*Cf.* Engelm. Bibl. i, p. 202; "most likely a mistake"; [qu. err. typog. for 1802?].)
- ?1825. (*Cf.* Jardine, Introd. to ed. of 1829, p. vii.—Erroneous?)
1829. JARDINE edition. 1 vol. 12mo. Edinburgh, Constable & Co., and London, Hurst, Chance & Co.
1829. *The same*, forming vol. xlv of "Constable's Miscellany."
- ?1830. *The same*. (Cited by Ag. and Strickl. Bibl., ii, p. 561; perhaps in error.)
1832. *The same*; new title-page ending For Whittaker, Treacher & Co., London, and Waugh & Innes, Edinburgh. pp. xvi, 343.
1833. *The same*, reissued this year.
- ?1836. *The same*, reissued this year!
1833. *The same*. 1 vol. 8vo. London. Nathaniel Cooke. pp. xviii, 342, forming a vol. of the "National Illustrated Library".
1833. RENNIE edition. 1 vol. 8vo. London. For J. & J. Arch, etc. pp. xii, 562.

1877. NEWTON, A.—Continued.

1833. BROWN edition. 1 vol. 16mo. Edinburgh, J. Chambers, and London, W. Orr, and Dublin, W. Curry, Jr. & Co. pp. xii, 356. (Being vol. i of 'British Library.')
1834. *The same*, reissued.
- ?1835. *The same* (cf. Engla. Bibl., p. 202).
1840. *The same*. London. John Chidley.
1843. *The same*. Edinburgh. Andrew Shortrede.
1845. *The same*. J. Billing, Woking, Surrey.
1833. LADY DOVER edition. 1 vol. 12mo. London. For N. Hailes. p. x, 316. (The first "Bowdlerized" edition.)
- 1841 *et seq.* *The same*. 1 vol. 16mo. New York, Harper & Brothers. pp. 335. (Many reissues of this—1842, 1842 again, 1847, 1853, 1855, 1859 (or 1860), 1868.)
- ?1860. *The same*. London. Society for Promoting Christian Knowledge.
- ?1870. *The same*. 1 vol. 8vo. London. By the same Society. pp. x, 346. [No date; 1870 or 1871?]
1834. JESSE'S Gleanings in Natural History. London. John Murray.
1836. BLYTH edition. 1 vol. 8vo. London. Orr & Smith. pp. xx, 418.
1858. *The same*. 1 vol. 8vo. London, Edinburgh and New York, Thos. Nelson and Sons.
1837. BENNETT edition. 1 vol. 8vo. London. For J. & J. Arch, etc. pp. xxiv, 640.
1843. JENYNS edition. 1 vol. 16mo. London. J. Van Voorst. pp. xvi, 328.
1851. JESSE edition. London. Forming a vol. of Bohn's "Illustrated Library".
1854. *The same*, reissued. (pp. xiv, 416.)
1854. WOOD edition. 1 vol. 8vo. London. G. Routledge & Co. pp. viii, 428.
1875. BUCKLAND edition. 1 vol. 8vo. London. Macmillan & Co. pp. xxx, 591.
1875. *The same*. New York. Macmillan & Co.
1875. HARTING edition (after Bennett). 1 vol. 8vo. London. Beckers & Son. pp. xxii, 532.
1876. MARSHAM'S Correspondence, 1790-1793. < *Trans. Norfolk and Norwich Nat. Hist. Soc.*, ii, pp. 133-195.
1877. BELL edition. 2 vols. 8vo. London. Van Voorst. i, pp. lxx, 507; ii, pp. 410.
1879. DAVIES edition. 1 vol. 8vo. London. Warne & Co.

1877. RODD, E. H. To be published by subscription, Demy 8vo, The Birds of Cornwall: A Contribution to the Natural History of the County. By Edward Hearle Rodd. 8vo. pp. 4.
Prospectus.

1877. ROWLEY, G. D. On Flamborough Head. < *Rowl. Orn. Misc.*, iii, pt. xi, Nov., 1877, pp. 11-13, pll. lxxxii-lxxxv.

Interesting notice of the sea-birds of that place, with beautiful illustrations of the scenery.

1877. [SCLATER, P. L., and SALVIN, O.] Wharton's 'List of British Birds.' < *Ibis*, 4th ser., i, Oct., 1877, pp. 483, 484.

1877. "TANTRAMAR" []. More [English] Birds' Nests in Extraordinary Places. < *Forest and Stream*, ix, Dec. 13, 1877, p. 337.

1877. WHARTON, T. H. A List [of] British Birds. [The genera] arranged according to Sundevall's method. [The Nomenclature revised by] Henry Thornton Wharton, [M. A., M. R. C. S., F. Z. S.] — [London: [John Van Voorst, 1, Paternoster Row.] — [MDCCCLXXVII. 1 vol. 12mo. pp. i-iv, 1-20.]

The introduction includes a brief essay on nomenclature and classification. p. 14, for *Ereunetes pusillus* read *Tringa minutilla*. Cf. *Ibis*, 1877, p. 483.

1877. WHITE, G. The [Natural History and Antiquities] of [Selborne,] in the County of Southampton. [By the late] Rev. Gilbert White, [formerly Fellow of Oriel College, Oxford.] Edited by [Thomas Bell, F. R. S., F. L. S., F. G. S., &c.,] Professor of Zoology in King's College, London. [Volume I [11].] [mut. mut.] [London: [John Van Voorst, 1 Paternoster Row.] [MDCCCLXXVII. 2 vols. 8vo. Vol. I, Natural History, Antiquities, Naturalist's Calendar, Observations on various parts of Nature, and Poems, pp. i-lxx, 1-507, 8 illust. Vol. II, Correspondence, Sermon, Account book, Garden Kalendar, Animals and Plants, Geology, Roman-British Antiquities, &c., 3 p. ll., pp. 1-110, 6 illust.]

1878. MILLER, S. H., and SKERTCHLEY, S. B. J. The Fenland [past and present] by Samuel H. Miller, F. R. A. S., F. M. S., [etc.] [and] Sydney B. J. Skertchley, F. G. S., [etc.] [Illustrated with Engravings, Maps and Diagrams.] [Design.]

1878. MILLER, S. H., and SKERTCHLEY, S. B. J.—Continued.
 | Guthrie's Cross. | Wisbech: Leach and Son. | London: | Longmans, Green,
 and Co. | 1878. | [All rights reserved.] 1 vol. large 8vo, pp. xxxii, 649.
 Chapter XII, p. 555.—III. Birds in the past: Ancient Records, Plover Nesting, Drayton's
 Polyolbion, Swan Marks. IV. Decoys. V. List of Birds—permanent residents, that is,
 nesting, 101; regular visitants, 74; rare and occasional, 69. The list is extensively annotated.
1878. ROWLEY, G. D. A few words on Fen-land. < *Rowl. Orn. Misc.*, iii, pt. xiv,
 May, 1878, pp. 203-222, pll. cv-cix.
 An attractive article, with handsome plates of scenery, geese, &c.
1878. [SCLATER, P. L., and SALVIN, O.] Proposed B. O. U. List of British Birds.
 < *Ibis*, 4th ser., ii, July, 1878, pp. 386, 387.
1878. [SCLATER, P. L., and SALVIN, O.] The Dyke-Road Museum, Brighton. < *Ibis*,
 4th ser., ii, July, 1878, pp. 387, 388.
 Favourable notice of E. T. Booth's collection of mounted British Birds.
1878. [SCLATER, P. L., and SALVIN, O.] J. H. Gurney, Jun., on the Birds of the Fern
 Islands. < *Ibis*, 4th ser., ii, Oct., 1878, pp. 471, 472.
 Notice of the paper in *Proc. Nat. Hist. Soc. Glasgow*, 1877, pp. 268-278.
1879. ANON. Lubbock's Fauna of Norfolk. < *The Field* (London), iv, No. 1,416, Feb.
 14, 1880, p. 198.
 Extended review of the ed. of 1879.
1879. ANON. The Natural History of Selborne, and the Naturalists' Calendar. . . .
 < *The Zoologist*, 3d ser., iii, No. 36, Dec., 1879, pp. 494-496.
 Review of the Davies edition, 1879, of the work named.
1879. BECKWITH, W. E. A Guide to the Botany, Ornithology and Geology of Shrews-
 bury and its Vicinity. . . . The Ornithology by W. E. Beckwith. . . .
 Shrewsbury. Bunney and Davis. 1879. 1 vol. 12mo. pp. 65.
 Not seen.—The list of Birds "occupies about eight pages, and includes only those which
 have been observed within five or six miles of Shrewsbury—in all 165 out of 218 found in the
 county of Salop." (*Zoologist*, Apr., 1880, p. 158.)
1879. LUBBOCK, R. Observations on the Fauna of Norfolk, and more particularly on
 the District of the Broads. By the late Rev. Richard Lubbock, M. A., Rector
 of Eccles. New Edition by Thomas Southwell, F. Z. S. With a Memoir by
 Henry Stevenson, F. L. S. And Notes on Hawking in Norfolk by Alfred New-
 ton, M. A., F. R. S. Norwich and London. Jarrold and Sons. 1879. 1 vol.
 8vo. pp. 239.
 Not seen. See the orig. ed., 1845.
 "Lubbock may be said to have done for the Norfolk broads what White did for the parish
 of Selborne; and each has left behind him in the shape of a charming and instructive volume,
 a lasting memorial of a well-spent life. Lubbock's volume, written five-and-thirty years ago,
 has long been out of print and scarce; and the reliable nature of the information which it
 affords has for some time rendered a new edition a *desideratum* with naturalists." (*The*
Field, Feb. 14, 1880, p. 198.)
1879. WHITE, G. (Ed. Davies.) The Natural History of Selborne, and the Natural-
 ists' Calendar. By the Rev. Gilbert White, A. M. A New Edition. Edited,
 with Notes, by G. Christopher Davies, Author of 'The Swan and her Crew,'
 &c. London: Warne & Co. 1879. Post 8vo. Illustrated.
 Not seen—title from *The Zoologist*, Dec., 1879, pp. 494-496, when reviewed.
 "Although we are unable to understand how any necessity can possibly have arisen for
 another edition of White's 'Selborne,' three different editions having appeared within the
 last three years, . . . In the present instance the editor's chief merit seems to lie in the
 brevity of his notes; we should like to have added also in the accuracy of them. . . . We
 cannot say much for the engravings. The best are copies (electros, we presume), of Wolf's
 illustrations to Johns' 'British Birds and their Haunts,' engraved by Whynper. These
 were charming when they first appeared, but as they have been published some seventeen
 years, and have been used over and over again in different books, many of them are much
 worn, and the impressions consequently are not satisfactory." (*Zoologist*, l. c.)
1880. DIXON, C. Rural Bird Life | being | Essays on Ornithology | with instructions
 for preserving objects | relating to that science | by | Charles Dixon | with a

1880. DIXON, C.—Continued.

frontispiece in colours, and numerous illustrations | engraved on wood by G. Pearson | London | Longmans, Green, and Co. | 1880 | All rights reserved | 1 vol. 16mo. pp. i-xiv, 1-374, col'd frontisp., 4 pl. and 41 illustr. in text.

"My object in giving publicity to this little work has been solely to excite a love for the study of the feathered tribes—to place in a popular form the true economy of birds, showing their relations and positions in Nature's great system: . . ." The pages are attractive, as would be expected from the author's modest yet firm preface; though many persons may, as he feared they might, wish he had spent more time among books, if not less among birds. The volume is quite original, presenting some fresh facts, and discussing many interesting questions. It brings the flavor of the woods and fields.

The volume is reissued at Boston, Mass., by Estes and Lauriat, who purchased the stereotypic plates, and caused a new preface to be written by Dr. Coues, the American editor. The text, however, is identical. (It is just now—May, 1880—coming out.)

1880. [TUNSTALL, M.] Ornithologia Britannica. . . .

Not seen.—Orig. ed. 1771, *q. v.* This is a photolithographic reprint of the scarce tract, reduced in size from the folio original to demy 8vo; it is issued by "The Willoughby Society," formed in 1879 for the purpose of reprinting certain ornithological works of rarity or utility, and is the first of the series undertaken.

"In a Preface by the Editor, Professor Newton, a few particulars are given concerning the author, Marmaduke Tunstall, the reader being reminded that a memoir of him is given by Fox in his 'Synopsis of the Newcastle Museum,' published in 1827. His museum, including his collection of birds, which, it is said, cost him several thousand pounds, formed the basis of the Museum at Newcastle-on-Tyne, and from specimens contained in it were drawn *twelve* of the figures of birds in Brown's 'Illustrations of Zoology,' and *fifty* of Bewick's well-known engravings. This catalogue is interesting for its 'rarity' rather than its 'utility,' since it contains no descriptions—merely a list in English, Latin, and French, of the species known to the author as British." (*Zoologist*, Apr., 1880, p. 159.)

ADDITIONS AND CORRECTIONS.

For most of the following additions and corrections I am indebted to Professor NEWTON, who kindly examined many of the press-proofs, but whose valued emendations, though communicated with the utmost expedition, reached me too late for incorporation with the body of the article.

1667. MERRETT, C. Pinax Rerum Naturalium Britannicarum, . . .

"I have two copies of this ed., from one of which the original title-page (as printed by you) has been torn out, remains of it being visible, and a new title inserted. This resembles the original in all but the insertion of "Editio Secunda." as the 9th line, and alteration of the last two thus:— | Typis T. Roycroft, Impensis Cave Pulleyn, Prostat apud | Sam. Tomson in vico vulgo dicto Ducklane. 1667. |"

1753. MARTIN, M. A | Voyage | to St. Kilda. | The remotest of all the Hebrides, | or Western Isles of Scotland: | giving | An Account of the very remarkable in- | habitants of that Place, their Beauty and sin- | gular Chastity (Fornication and Adultery being | unknown among them); their Genius for | Poetry, Music, Dancing: their surprising Dex- | terity in climbing the Rocks, and Walls of | Houses; Diversions, Habits, Food, Language, | Diseases and methods of Cure; their extensive | Charity; their Contempt of Gold and Silver, | as below the Dignity of Human Nature; their | Religious Ceremonies, Notion of Spirits and | Visions, &c. &c. | To which is added, | An Account of Roderick, the late Impostor there, | pretending to be sent by St. John Baptist, with new Revelations and Discoveries; his Diabolical Inventions, At- | tempts upon the Women, &c. | By M. Martin, Gent. | The Fourth Edition, corrected. | [Quotation of 3 lines from p. 67 of the book.] | London: | Printed for Dan. Browne, without Temple-Bar, | and Lockyer Davis, in Fleet Street. | MDCCLIII. 1 vol. 8vo. pp. 71, the last wrongly numbered "63," frontisp., a map, and figg. of two birds.

Orig. ed. 1698. Earlier eds. are rare. The present is that from which the ed. in Pinkerton's *Voyages* is derived.—Birds are described at pp. 26-36: "The Sea-Fowl are, first, Gairfowl [*Alca impennis*], being the stateliest, as well as the largest Sort," etc. Birds figured are the "Fulmar" [*Fulmarus glacialis*] and the Assilag [*Procellaria pelagica*]. The picture of the Fulmar was drawn by James Monroe: cf. Edwards's *Nat. Hist.*, p. 289; and Gurney, *Zoologist*, 2d ser., xi, 1876, p. 4931

1766. [PENNANT, T.] The | British Zoology. | Class I. Quadrupeds. | II. Birds. | Published under the Inspection of the | Cymmrodorian Society, | instituted for the | Promoting Useful Charities, and the Knowledge of | Nature, among the Descendants of the | Ancient Britons. | Illustrated with | One Hundred and Seven Copper Plates. | London: | Printed by J. and J. March, on Tower Hill, for the Society: | And sold for the Benefit of the British Charity-School on | Clerkenwell Green. M, DCC, LXVI. 1 vol. folio. Tit., 1 fol.; Dedie., 1 fol.; Preface, Contents and Errata, 5 foll.; pp. 1-162 + 4 pp. Index, &c. (Birds, p. 57 to end.)

My entry of this work was left very defective. Prof. Newton supplies the above full title of the orig. ed., and corrections as follows:—

1766. *Editio princeps*, ut suprâ.

1768. *Second edition*. 8vo.

1770. *Third edition*. 8vo. "A thin volume, supplementary to the preceding, must rank as the 3d edition."

1776-77. "*Fourth*" edition. 4 vols., in two issues, 8vo and 4to. "Plates identical, but letter-press wholly distinct."

1812. *Fifth edition*. 4 vols. 8vo. (First ed. with author's name on the title.) "This posthumous ed. is said by E. T. Bennett in his ed. of White's 'Selborne' (p. 113, note) to have been edited by Hammer, a statement corroborated in a letter to me from J. E. Gray, who added that he gave Bennett the information—but Hammer is spoken of (p. xxvii) as being merely one of the editor's friends who assisted him—the others being Latham, Hawkins [who seems to have furnished notes on birds of Greece], Henry Jenner (nephew of the great man) and Hugh Davies—the additions of the latest being mainly or wholly on Invertebrates. On the other hand, the anonymous author (probably Neville Wood) of a memoir of Latham (*Nat.* iv. p. 31), speaking of Latham's revision of this work, which he seems to regard as the 'second edition' of Pennant, says it 'was published by his son, Mr. D. Pennant.'"

Above enumeration of eds. is exclusive of Murr's Latin-German version, 1771-76.

1768. [PENNANT, T.] British Zoology. | Class I. Quadrupeds. | II. Birds. | Si qui verò sint in urbe sua Hospites, in Patria sua Peregrini, et | cognitione semper pueri esse velint, sibi per me placeant, sibi | dormiant; non ego illis hæc conscripsi, non illis vigilavi. | Camden. Britan. Prefat. | Vol. I. | London: | Printed for Benjamin White, | at Horace's Head, Fleet-Street. | MDCCCLXVIII.
[Title of 2d vol. changed thus:—]

British Zoology. | Class II. Genus XVIII, &c. Birds. | With an | Appendix, | an | Essay on Birds of Passage, | and | an Index. | Vol. II. | [rest as above.]
3 vols. 8vo. Vol. I. Tit., 1 fol.; Preface, &c., pp. i-xxiv; Text, pp. 1-232, ending abruptly with a catch-word. Ornithology, pp. 117 to end. Vol. II, after tit., 1 fol., begins abruptly at p. 233 (pagination thus being continuous with that of Vol. I), and text ends at p. 522; Index, pp. i-ix + i having separate pagination. (Vol. III treats of Reptiles and Fishes.)

This is the *second ed.*

1770. [PENNANT, T.] British Zoology. | Illustrated by | Plates | and brief | Explanations. | Chester: | printed by Eliz. Adams, | MDCCCLXX. 1 vol. 8vo. Tit., dedie., advt., 3 foll.; pp. —.

This must rank as the *third ed.* It is supplementary to the former. The copy examined is imperfect, but is believed to contain all the ornithology, which begins at p. 7 and ends at p. 27.

1771. [TUNSTALL, M.] Ornithologia Britannica: | seu | Avium omnium Britannicarum tam Terrestrium, | quam Aquaticarum | Catalogus, | Sermoni Latino, Anglico et Gallico redditus: | cui subjeitur Appendix, | Aves alienigenas, | in Angliam raro advenientes, complectens. | In tenni labor: at tennis non gloria—Virg. | London: | Printed for the Author by J. Dixwell, in St. Martin's Lane. | M. DCC. LXXI. folio. Tit., 1 fol., and pp. 4.

Of this anonymous tract, more remarkable for its rarity than for its utility, a facsimile in photolithography, reduced to 8vo size, was issued by the Willoughby Society, 1880, *q. v.*

1776-77. [PENNANT, T.] British Zoology. . . .

The orig. ed., 1 vol. folio, dates 1766, *q. v.* The 2d ed., 3 vols., 8vo, dates 1768. The ed. of 1770, 1 vol., 8vo, must count as the third. There are *two* issues of date 1776-77, each in 4 vols., one 8vo, the other 4to. These two issues, though each bearing the words "Fourth Edition" on the printed title-pages, are absolutely distinct—the plates in each being printed on paper of different sizes. Ornithology begins in the 8vo at p. 153, and in the 4to at p. 133.—Whence it appears that in the body of this Bibliography I have got the editions of Pennant badly mixed up, and otherwise very defective.

1789. WALCOTT, T. Synopsis of British Birds. . . .

The story has always gone that Walcott, being dissatisfied with the book, had nearly the whole impression destroyed; but copies do not seem to be rare.

1794-1819. DONOVAN, E. The Natural History of British Birds; . . .

I have made a bad break in citing this work as of "2 vols. in one", with "48" plates, and of dates "1794-95."

According to Prof. Newton's memoranda, the work is in 10 vols., with 244 plates, of dates 1794-1819.—Vol. I, 1794.—Vol. II, 1795.—Vol. III, —?; "new ed." 1815; after "By E. Donovan"; in the title comes | A New Edition. | and then as before.—Vol. IV, 1797.—Vol. V, —?; 1820; after "specimens" in the title comes | By E. Donovan, F. L. S. W. S. | Author of the Natural Histories of British Fishes, Insects, Shells, Quadrupeds, &c. | In ten volumes. | Vol. V. | London: | printed for the author; | and for F. C. and J. Rivington, 62, St. Paul's Church-Yard, | and 3, Waterloo-Place, Pall-Mall; | By R. Gilbert, St. John's-Square, Clerkenwell. | 1820.—Vol. VI, 1809.—Vol. VII, 1816.—Vol. VIII, 1817.—Vol. IX, 1818.—Vol. X, 1819.—The title-pages of all, excepting III and V, are alike, *mutatis mutandis*; the last has the imprint—London: | printed for the Author; and for F. C. and J. Rivington, No. 63, | St. Paul's Church-Yard, and No. 3, Waterloo-Place, | Pall-Mall. 1819. |

1797-1804. BEWICK, T. History of British Birds. . . .

Respecting the two issues of Vol. I, Land Birds, 1797, Prof. Newton remarks: "The typography of these two issues is wholly distinct; the difficulty at first is to say which of them was the earlier. I believe this may be decided by looking at p. 71, lines 5 and 6, where the words "bill, nostrils, and even round the eyes" of what seems to be the oldest issue are replaced in the later by "bill and nostrils, as far as the eyes"—the last expression being retained in subsequent editions. On the other hand, on p. 145 we have, in what I take to be the earlier issue, "*Schanielus*" which in the later is still further corrupted into "*Sahemielus*"; but on the reverse of p. 335 in one issue the *third* ed. of Bewick's "Quadrupeds" is announced as lately published, while in the other the announcement is that the *fourth* ed. of that work "speedily will be published"; which seems to be final and decisive."

The 3d ed., 1809, is said to be the worst, owing to bad paper.

In the 8th ed., 1847, some of the woodcuts have utterly failed, but the majority show details better than in any other ed.

An elaborate Catalogue of works illustrated by Bewick and his brother John was published by John Gray Bell, London, 1851.

1799? ANON. Our [British] Song Birds. . . .

Doubtless of quite recent date. Qu., a reprint of Albin's book?

1799. PULTENEY, R. Catalogues | of the | Birds, Shells, and some of the | more rare Plants, of | Dorsetshire. | From the | new and enlarged edition of | Mr. Hutchins's History of that County. | By Richard Pulteney, M. D. F. R. S. Lond. & Edinb. | and Fellow of the Linnean Society. | London, printed by J. Nichols, | for the use of the compiler and his friends. | MDCXCIX. 1 vol. folio. Title and pp. 92.

Ornithology occupies pp. 1-22.—An enlarged ed. appeared in 1813. See also MANSEL-PLEYDELL, 1874. Cf. *Ibis*, 1874, p. 447.

1804. BEWICK, T. History | of | British Birds. | The Figures engraved on wood by T. Bewick. | Vol. II. Water Birds. | [Cut.] | Newcastle: | printed by Edward Walker, for T. Bewick: sold by him, and | Longman and Rees, London. | [Price 18s. in Boards.] | 1804.

This is the full title of Vol. II. See the date 1797-1804, in the body of this Bibliography.

1815-22. HUNT, J. British | Ornithology; | containing portraits of all the | British Birds, | including those of foreign origin, | which have become domesticated; | drawn, engraved and coloured | by J[ohn]. Hunt | with descriptions compiled from the | works of the most | Esteemed Naturalists, | & arranged according to the | Linnean Classification. | Vol. I [-III]. | Inscribed by Per-

1815-22. HUNT, J.—Continued.

mission | To Sir J. E. Smith, | M. D. F. R. S. | and President of the Linnæan Society. | Norwich; 1815 [-1822]. | Printed by Bacon & Co. for the Proprietor & may be had of the Booksellers. 3 vols. 8vo. Pub. in parts of about 12 pll., dates unknown to me. Vol. I, engr. title (only?), pp. 183, with 34 pll. Vol. II, pp. 365, with 58 pll. Vol. III, pp. 138, ending abruptly, with 18 pll. belonging to text, and 76 pll. to which text was never published.

Perfect copies are extremely rare. The work appeared in parts, announced to be quarterly; corresponding plates and text seem not to have been issued together in all cases. The work was never completed. The author died in 1842.

1825. SELBY, P. J. Illustrations | of | British Ornithology. | By Prideaux John Selby, Esq. | Member of the Wernerian Natural History Society. | Part First. | Land Birds. | Edinburgh: | printed for Archibald Constable & Co. Edinburgh; | and Hurst, Robinson, & Co. London. | 1825. 1 vol. 8vo. pp. i-xxxvi, 1-335.

See what is said in the body of this Bibliography at date of 1833, same author.—The above is the title and collation of the *original* edition of the *text* of Vol. I of the work. This original is rare.

1826-28. DONOVAN, E. The Natural History of the Nests and Eggs of British Birds; . . .

The incomplete date is to be filled in as above. Five parts appeared, neither 4 nor 5 being dated. "No. V has lately appeared": *Ed. Mag. N. II.*, ii, Sept., 1829, p. 394.

1828. FLEMING, J. A | History | of | British Animals, | exhibiting the | descriptive characters and systematical arrangement | of | the Genera and Species of Quadrupeds, Birds, | Reptiles, Fishes, Mollusca, and Radiata | of the United Kingdom; | including | the indigenous, extirpated, and extinct | kinds, together with periodical | and occasional visitants. | By | John Fleming, D. D. F. R. S. E. M. W. S. &c. | Minister of Flisk, Fifeshire; | and author of the "Philosophy of Zoology." | Edinburgh: | printed for Bell & Bradfeete, Edinburgh; and James Duncan, London. | MDCCCXXVIII. 1 vol. 8vo. pp. i-xxiv, 1-565. Birds, pp. 41-146.

1828. [HOPE, J.] Memorandum from the Right Honourable . . .

1829. "CORRESPONDENT."

Numerous articles bearing this pseudonym are all believed to be by T. C. Heysham. Cf. *Mag. N. II.*, i, p. 290; ii, p. 89; iii, p. 172, *et aliis locis*.

1829. "J. D. M."

This is J. D. Marshall, *fide* Thomps., *B. Irel.*, ii, p. 82. These initials have the same significance in other places.

1829. WHITE, G. (*Ed. Jardine*.)

Of the two 1829 Jardine editions which I have given, the one that comes second on my page is that forming a vol. of Constable's *Miscellany*, as I have stated; it has an engraved title, with a design drawn by D. O. Hill and engraved by Tho. Dick; the collation is: title and introd., x pp.; text, 330 pp.—The one that comes first on my page has as frontisp. the engr. title of the latter; it is as the last, with some omissions. Other issues of this, with slightly altered title, were published bearing date 1832 and 1833.

1829. "W. J."

This is Sir William Jardine.

1831-38. HEWITSON, W. C. British Oology; . . .

The 1st ed. of this work was published in 37 parts, at irregular intervals, from April, 1831, to June, 1838. A supplement appeared in 1842. There was a 2d ed. in 1842-46, and a 3d ed. in 1853-58. See all these dates, as given beyond in this Bibliography. The orig. ed. forms either 2 or 3 vols. The quotation on the title differs in each vol.

The following are the dates of issue of the 37 parts of the orig. ed.

VOL. I.—Pt. i, Apr. 1, 1831, pll. 1-4, and text. Pt. ii, May 15, 1831, pll. 5-8, text to 6 and 7 only. Pt. iii, Oct. 1, 1831, pll. 9-12, text to 5, 8-12. Pt. iv, Dec. 1, 1831, pll. 13-16, and text. Pt. v, Feb. 1, 1832, pll. 17-20, and text. Pt. vi, Apr. 1, 1832, pll. 21-24, and text. Pt. vii, June 1, 1832, pll. 25, 27, 28, 30, and text. Pt. viii, Aug. 1, 1832, pll. 29, 31-33, and text. Pt. ix, Oct. 1, 1832, pll. 26, 35-37, and text. Pt. x, Dec. 1, 1832, pll. 38, 39, 41, 43, and text. Pt. xi, Feb. 1, 1833, pll. 40, 42, and text. Pt. xii, Apr. 1, 1833, pll. 44-49, and text, with title-page for Vol. I, dedication, and list of subscribers.

1831-38. HEWITSON, W. C.—Continued.

VOL. II.—Pt. xiii, Oct. 1, 1833, pll. 50, 51, and text. Pts. xiv, xv, Dec. 1, 1833, pll. 52-61, and text. Pt. xvi, Mar. 1, 1834, pll. 62-65, and text. Pt. xvii, May 1, 1834, pll. 66-69, and text. Pt. xviii, Aug. 1, 1834, pll. 70-73, and text. Pt. xix, Nov. 1, 1834, pll. 74-77, and text. Pt. xx, Mar. 1, 1835, pll. 78-81, and text. Pt. xxi, May 1, 1835, pll. 82-85, and text. Pt. xxii, July 1, 1835, pll. 86-89, and text. Pts. xxiii and xxiv, Nov. 1, 1835, pll. 90-94, 96, 98, 99, and text, with title-page to Vol. II, and dedication.

VOL. III.—Pt. xxv, Jan. 1, 1836, pll. 95, 97, 103, 34, and text. Pt. xxvi, Mar. 1, 1836, pll. 100-102, 104, and text. Pt. xxvii, May 1, 1836, pll. 105-108, and text. Pt. xxviii, July 1, 1836, pll. 109-112, and text. Pt. xxix, Sept. 1, 1836, pll. 113-116, and text. Pts. xxx and xxxi, Jan. 1, 1837, pll. 117, 118, 120-124, and text, and part of text for pl. 119. Pts. xxxii and xxxiii, May 1, 1837, pll. 125-132, and text. Pts. xxxiv and xxxv, Sept. 1, 1837, pll. 133-142, and text. Pt. xxxvi, Jan. 1, 1838, pp. 143-146, and pl. 119, with text. Pt. xxxvii, June 1, 1838, pll. 147-155, and a new copy of pl. 87 instead of that before issued, which is to be cancelled; with title-page to Vol. III, directions to binder, list of subscribers, viii pp.; introduction, 15 pp.; systematic index to suit binding in 2 vols. (as recommended by author), and index to each of the 3 vols. if that number be preferred.

1831. SELBY, P. J. A Catalogue . . .

The title is correctly given. The paper was read Feb. 21, 1831. It gives 214 spp. The list was the first for this locality, of any authority or approaching completeness, for over 40 years, as I have said; but dele in my comment the words "and remained single."

1831. SELBY, P. J. Notice of *Cypselus alpinus* and *Mergus eucullatus*. < *Trans. Nat. Hist. Soc. Northumb. and Durh.*, i, 1831, pp. 291-293.

"As acquisitions to the British Fauna."

1831. "T. G."

This is T. Goatley; and the initials stand for the same name in other places; but there is a second "T. G.," who wrote in *Mag. Nat. Hist.*, hailing from Lancashire; see 1833; this being a different person.

1831. "X. Y. Z."

This is G. Duncan: cf. *Mag. N. H.*, v, p. 571.

1832 or 1833? FOX, G. T. Notice of some Rare Birds, recently killed in the Counties of Northumberland and Durham. < *Trans. Nat. Hist. Soc. Northumb. and Durh.*, ii, pp. 181-186.

Read Nov. 21, 1831. Records *Pernis apivorus* and *Tringa subarquata*.

1832 or 1833? SELBY, P. J. An account of Two rare British Birds. < *Trans. Nat. Hist. Soc. Northumb. and Durh.*, ii, pp. 273-275.

Read May 21, 1832. Records *Pernis apivorus* and *Scolopax sabini*.

1832. SLANEY, R. A. An Outline of the smaller British Birds. . . .

This is the date of the orig. ed. The title-page is just as I have given it, excepting the author's name, given as Robert A. Slaney. The collation of this ed. is pp. viii, 143.

1832. "T. K."

This is T. Knox: cf. *Mag. N. H.*, v, p. 731, and Thomps., *B. Irel.*, ii, p. 320.

1833. MONTAGU, G. (*Ed. Rennie, J.*)

Rennie's ed. of Montagu's *Dictionary* was reissued in 1833, with a new title-page bearing that date.

1834. "J. G."

This is J. Grubb: cf. *Mag. N. H.*, viii, p. 511.

1842. HEWITSON, W. C. Supplement | to | British Oology; | by | William C. Hewitson. | London: | John Van Voorst, Paternoster Row. | M. DCCC.XLII. 1 vol. 8vo. 4 pll. and text.

Has no title-page; the wrapper is as above, with addition of "1st October." Contains pll. 156-169, with accompanying text; also an Introduction, and an index to the English names of the eggs figured, arranged for binding them in 2 vols.

The title which stands in the body of the Bibliography, p. 425, at date of "1850?," I took, I find, from a copy of the original edition, including the present supplement, there being 169 plates in all. Without this supplement, the work dates 1831-38; with it, 1831-42. It is found in 2 or in 3 vols. The 2d ed. dates 1842-46. The 3d ed. dates 1853-56. See the orig. ed.

- 1842-46. HEWITSON, W. C. Colored Illustrations | of the | Eggs of British Birds, | accompanied with descriptions | of the | Eggs, Nests, etc. | By William C. Hewitson. | In Two Volumes. | Vol. I [II]. | London: | John Van Voorst, Paternoster Row. | [M. D. CCCXLII-] M. D. CCCXLVI. 2 vols. 8 vo. pp. i-xvi, 1-470, continuous through both vols. Pls. 1-137 plus 7 which are numbered 12*, 25*, 37*, 67*, 78*, 101*, 120*= 144.
Orig. ed., 1831-38, *q. v.*; Supplement, 1842, *q. v.* This is the 2d ed., which appeared in monthly parts during 1842-46, but I cannot give the details. The plates of the 'Supplement' are utilized, but otherwise all is new. There is a 3d ed., 1853-56, *q. v.*
1846. GURNEY, J. H., and FISHER, W. R. An Account | of the | Birds found in Norfolk, | including | notices of some of the rarer species, | which have occurred in the adjoining counties; | with | remarks on Migration, | and a table showing the number of the resident and | migratory species of each family. | By | John Henry Gurney | and | William Richard Fisher. | [From the Zoologist.] | London: | printed by E. Newman, 9 Devonshire Street, Bishopsgate Street. | 1846.
This is the full title of the reprint from the *Zoologist*, pp. 1300-1324, 1373-1393.
1846. ST. JOHN, C. Short Sketches of the Wild Sports and Natural History . . .
This either appeared originally in, or was subsequently incorporated with the series known as "Murray's Home and Colonial Library". There are several issues. I have given one of 1847 in full. There is another dated 1849.
1846. "W. H. S."
This is W. H. Slaney.
1847. BATTERSBY, R. Occurrence of the . . . Harlequin Duck near Torquay. . .
For correction of this statement, cf. *Ibis*, 1859, p. 165.
1848. BURY, C. A.
Dele, as not British.
1848. HOLM, P. A.
Dele, as not British.
1848. MALAN, S. C. A Systematic | Catalogue | of the | Eggs | of British Birds; | arranged with the view to supersede the use of | Labels for Eggs. | By the Rev. S. C. Malan, M. A., | Vicar of Broadwindsor, Dorset. | London: | John Van Voorst, 1, Paternoster Row. | MDCCCXLVIII.
1849. [NEWMAN, E.] The | Letters of Rusticus | on the | Natural History | of | Godalming. | Extracted from the | Magazine of Natural History, | the | Entomological Magazine, | and the | Entomologist. | [Ornament.] | —"Stat nominis umbra." | [Cut.] | London: printed for John Van Voorst, Bookseller and | Publisher, No. 1 Paternoster Row. | M. DCCC. XLIX.
1850. WOLLEY, J.
Dele, as not British.
1851. CROUCH, W. D. List of Birds' Eggs found in Somersetshire, with Observations. < *Somersetshire. Archaeol. and Nat. Hist. Soc., Proc. at the Gen. Quart. and Ann. Meetings for 1849 and 1850, 1851, Papers*, pp. 149-174.
Notices 109 spp.
1851. CROUCH, W. D. The | Birds | of | Somersetshire. | With | colored illustrations, | of their heads, sterna, feet and eggs. | By | W. D. Crouch. | [Poetical extract of 8 lines from] | C. W. Thompson. | Taunton: | Printed by Frederick May, High Street. | No. 1 only published. 8vo. pp. 24, pls. vi.
1851. WHITE, G. (*Ed. Jesse*.) The | Natural History | of | Selborne; | with | Observations on various parts of Nature; | and | the Naturalist's Calendar. | By the late | Rev. Gilbert White, A. M. | Fellow of Oriel College, Oxford. | With additions and supplementary notes by | Sir William Jardine, Bart. F. R. S. E., F. L. S., M. W. S. | Edited, with further illustrations, a biographical sketch of the author, | and a complete index, by | Edward Jesse, Esq. | Author of

1851. WHITE, G.—Continued.

"Gleanings of Natural History," &c. &c. | With forty engravings. | London: | Henry G. Bohn, York Street, Covent Garden. | MDCCCLI.
Forming a vol. of Bohn's "Illustrated Library."

1852. WHEELWRIGHT, H. W.

According to Wallengren (*Naumannia*, 1854, p. 63), the title is "Comparative List of the Birds of Scandinavia and Great-Britain." It cannot be in German, though there was probably an alternative Swedish title.

1853-56. HEWITSON, W. C. Colored Illustrations | of the | Eggs of British Birds, | with descriptions of | their nests and nidification. | By William C. Hewitson. | Third edition. | In Two Volumes. | Vol. I [II]. | London: | John Van Voorst, Paternoster Row. | [M. DCCC. LIII-] M. DCCC. LVI. 2 vols. 8vo.

Orig. ed., 1831-34; Supplement, 1842; Second ed., 1842-46. See these dates. The present, third ed., also appeared in parts; there were 38 of them, pub. May, 1853, to June, 1856, as follows:

Part I, May, 1853, pll. 1-4, pp. 1-16 (preface). Pt. ii, June, 1853, pll. 5-8, pp. 17-32. Pt. iii, July, 1853, pll. 9-12, pp. 33-48. Pt. iv, Aug., 1853, pll. 13-16, pp. 49-64. Pt. v, Sept., 1853, pll. 17-20, pp. 65-80. Pt. vi, Oct., 1853, pll. 21-24, pp. 81-96. Pt. vii, Nov., 1853, pll. 25-28, pp. 97-112. Pt. viii, Dec., 1853, pll. 29-32, pp. 113-128. Pt. ix, Jan., 1854, pll. 33-36, pp. 129-144. Pt. x, Feb., 1854, pll. 37-40, pp. 145-160. Pt. xi, Mar., 1854, pll. 41-44, pp. 161-176. Pt. xii, Apr., 1854, pll. 45-48, pp. 177-192. Pt. xiii, May, 1854, pll. 49-52, pp. 193-208. Pt. xiv, June, 1854, pll. 53-56, pp. 209-224. Pt. xv, July, 1854, pll. 57-60, pp. 225-240. Pt. xvi, Aug., 1854, pll. 61-64, pp. 241-256. Pt. xvii, Sept., 1854, pll. 65-68, pp. 257-272. Pt. xviii, Oct., 1854, pll. 69-72, pp. 273-288. Pt. xix, Nov., 1854, pll. 73-76, pp. 289-304. Pt. xx, Dec., 1854, pll. 77-80, pp. 305-320. Pt. xxi, Jan., 1855, pll. 81-84, pp. (none). Pt. xxii, Feb., 1855, pll. 85-88, pp. 321-336. Pt. xxiii, Mar., 1855, pll. 89-91, 90*, pp. 334*, 337-350. Pt. xxiv, Apr., 1855, pll. 92-95, pp. (none). Pt. xxv, May, 1855, pll. 96-99, pp. 351-366. Pt. xxvi, June, 1855, pll. 100-103, pp. (none). Pt. xxvii, July, 1855, pll. 104-107, pp. 367-382. Pt. xxviii, Aug., 1855, pll. 108-111, pp. 383-398. Pt. xxix, Sept., 1855, pll. 112-115, pp. 399-414. Pt. xxx, Oct., 1855, pll. 116-119, pp. 415-430. Pt. xxxi, Nov., 1855, pll. 120-123, pp. 431-446. Pt. xxxii, Dec., 1855, pll. 124-127, pp. 447-462. Pt. xxxiii, Jan., 1856, pll. 128-131, pp. 463-478. Pt. xxxiv, Feb., 1856, pll. 132-135, pp. 479-494. Pt. xxxv, Mar., 1856, pll. 136-139, pp. 495-510. Pt. xxxvi, Apr., 1856, pll. 140-143, pp. (none). Pt. xxxvii, May, 1856, pll. 144, 145, 45*, 53*, pp. 511-522, 178*, 210*. Pt. xxxviii, June, 1856, pll. 46*, 51*, pp. 202*, 289*; with Title-pages, Introduction, and Index. (pp. 1-522 of text, plus 178*, 202*, 210*, 289*, 334*. pll. 1-145, plus 45*, 46*, 51*, 53*, 90*.)

1853. WATTERS, J. J. The | Natural History | of | the Birds of Ireland, | Indigenous and Migratory, | containing | Descriptions of the Habits, Migrations, Occurrence, and | Economy of the 261 Species comprised in the Fauna. | By John J. Watters, | Associate Member of the University Zoological Association. | Dublin: | James McGlashan, 50 Upper Sackville-St. | William S. Orr & Co. London. | 1853. 1 vol. 12mo.

1854. WHITE, G. (*Ed. Jesse*.)

The edition of this date and editor is apparently a reissue of that of 1851.

1859. NEWMAN, E. The 'Zoologist' List of Birds . . .

"There are many issues of this list, mostly, I think, without dates; and not all are by Newman, though those styled "The 'Zoologist' List" are certainly his. The first I remember to have seen was at least ten years prior to 1859. I had two such lists printed for my own convenience long before 1859." (*A. N.*)

1859. [WHEELWRIGHT, H. W.] Comparatif förteckning på Skan- | dinaviens och Stor-Britanniens | fåglar | [and in parallel columns] Comparative List of the Birds | of Scandinavia and Great Bri- | tain | 1859. | Carlstad. | Tryckt hos C. Forssell, | 1859. | 4to. pp. 18.

Gives scientific, Swedish and English names of 416 species.

1860. MORE, A. G. Outlines | of the | Natural History | of | the Isle of Wight. | Edited by | A. G. More, F. L. S. | Extracted from | A New Guide to the Isle of Wight. | By Rev. E. Venables, M. A. | London: | printed by | Spottiswoode & Co. New-Street Square. | 1860.

1870. MORRIS, F. O. A History of British Birds. . . .

Orig. ed. 1851-57. Another ed. 1865-66. Another ed. 1870.



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